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AIRLINE RESERVATION SYSTEMS

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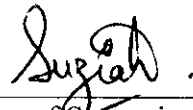
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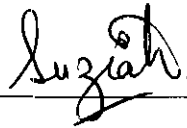
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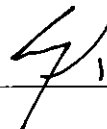


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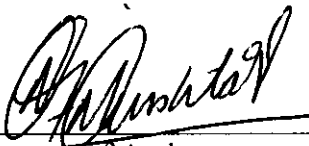
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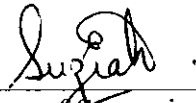
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DEDICATION

This dissertation is dedication to my father, who unconditionally loved me since I was born. I wish you could stay few more years to see all my success and amazing accomplishments. I wish you could see that I am going to be a PhD. I wish you could see that I have become a father of a loving daughter. You are truly missed. I love you!

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I owe endless thankfulness to all those such as students, staff, travel agents, travelers and other anonymous evaluators who participated in the survey. Special appreciation goes to Gehan for helping me in making the interface prototype. The final study would have not been possible without them. Lastly, I am grateful to my friend for providing me numerous distractions and relaxation opportunities during the journey of this dissertation.

ABSTRACT

It is very critical for the organizations to design flexible systems that are easy to use and can accomplish all the requirements by way of offering customizability. Philosophers argue that users are good in adapting the systems; however, research shows users dissatisfaction with existing Online Airline Reservation Systems in terms of task completion. Therefore, researchers are eager to find out ways for improving online usability of the systems, how users' Perceived Usability of the system is formulated by its flexibility functions. This research therefore examines travelers' expectations, preferences and online behavior (Users' Flexibility) and aligns that with designing of flexible online airline reservation systems (System's Flexibility) and users' as evaluators of the online systems to determine its Perceived Usability through users' effectiveness, efficiency and satisfaction (Perceived Usability).

In this dissertation, both quantitative and qualitative techniques were used to analyze the data collected in the context of SF, UF and PU of the systems. A redesign solution for enhanced usability was developed based on HCI guidelines and the flexibility tactics used in online travel agencies, which led to a proposed interface with the integration of opaque mechanism. The two interfaces were used in the experiment. Participants were requested to complete the evaluation of the existing and proposed interfaces.

The findings suggested that users can be classified on the basis of their Flexible Traveling Behavior which led to the development of a Users' Flexibility measuring scale. It is further investigated that integration of opaque fares concept would increase the usability of the system. Since flexibility is referred to its ability to respond to internal or external changes, systems incorporated with opaque fares would serve the role of external change agent by way of providing flexibility in users' decision making and will also serve the role of internal change agent by way of providing the capability of accepting changed decisions.

ABSTRAK

Ini adalah sangat penting bagi organisasi untuk mereka bentuk sistem yang fleksibel dan mudah untuk digunakan serta boleh mencapai semua keperluan dengan cara menawarkan kebolehan untuk mengubahsuai. Ahli-ahli falsafah berpendapat bahawa pengguna berkebolehan untuk menyesuaikan diri menggunakan sesuatu sistem, namun kajian menunjukkan rasa tidak puas hati pengguna dengan sistem yang sedia ada dalam tempahan penerbangan secara talian dari segi menyelesaikan tugas. Oleh sebab itu, para penyelidik amat berminat untuk mengetahui cara-cara untuk meningkatkan kebolehgunaan system dalam talian, dan bagaimana persepsi pengguna terhadap menganggap kebolehgunaan sistem dapat digubal menerusi fungsi fleksibilitinya. Kajian ini meneliti jangkaan pelancong, keutamaan dan tingkah laku mereka dalam talian (fleksibiliti pengguna) dan menjajarkannya dengan reka bentuk system tempahan penerbangan dalam talian (sistem fleksibiliti) dan meletakkan pengguna sebagai penilai sistem tersebut bagi menentukan kebolehgunaan melalui kepuasan pengguna (persepsi kebolehgunaan).

Dalam disertasi ini, kedua-dua teknik kuantitatif dan kualitatif telah digunakan untuk menganalisa data yang dikumpulkan dalam konteks fleksibiliti, kelonggaran sistem pengguna dan kebolehgunaan sistem. Satu penyelesaian bagi mereka bentuk semula untuk memberi kegunaan yang lebih tinggi telah dibangunkan berdasarkan garis panduan *HCI* dan taktik yang fleksibel yang digunakan dalam agensi-agensi pelancongan dalam talian. Satu rekabentuk sistem tempahan penerbangan dalam talian yang baru telah diaplikasikan dan membawa kepada antara muka yang dicadangkan dengan integrasi mekanisme legap. Kedua-dua antara muka telah digunakan dalam eksperimen tersebut. Para peserta telah diminta untuk melengkapkan penilaian antara muka yang sedia ada dan yang dicadangkan.

Hasil penemuan mencadangkan supaya pengguna boleh dikelaskan berdasarkan tingkah laku perjalanan mereka yang fleksibel yang lantaran itu membawa kepada

pembangunan skala mengukur fleksibiliti seorang pengguna. Perkara ini disiasat dengan lebih mendalam yang mana integrasi konsep tambang legap akan meningkatkan kebolegunaan system. Oleh sebab fleksibiliti dirujuk dengan keupayaan untuk bertindak balas terhadap perubahan dalaman atau luaran, sistem yang diperbadankan dengan tambang legap akan ber peranan sebagai agen perubahan luaran dengan menyediakan fleksibiliti supaya pengguna dapat membuat keputusan dan juga akan berperanan sebagai agen perubahan dalaman melalui penyediaan keupayaan menerima keputusan berubah.

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LIST OF ABBREVIATIONS

| | |
|--------|--|
| ARS | Airline Reservation System |
| ACM | Association for Computing Machinery |
| B2C | Business to Consumer |
| CRS | Computer Reservation System |
| CI | Confidence Interval |
| FTB | Flexible Traveling Behavior |
| FOARS | Flexible Online Airline Reservation System |
| FG | Focus Group |
| FR | Functional Requirements |
| GDS | Global Distribution System |
| GUI | Graphical User Interface |
| HCI | Human Computer Interaction |
| ID | In-depth |
| NFR | Non-Functional Requirements |
| OTA | Online Travel Agencies |
| OCBT | Online Corporate Booking Tool |
| OARS | Online Airline Reservation System |
| OTF | Online Travel Forums |
| PU | Perceived Usability |
| PLF | Passenger Load Factor |
| SBT | Self-booking Tool |
| SF | System Flexibility |
| SABRE | Semi-Automated Business Research Environment |
| SIGCHI | Special Interest Group on Human Computer Interaction |
| SQA | Service Quality Attributes |
| TAM | Technology Acceptance Model |
| TPB | Theory of Planned Behavior |
| UF | User Flexibility |
| UFS | User Flexibility Score |

CHAPTER 1

INTRODUCTION

1.1 Research Background

Airline Reservation Systems are the computerized systems that are used for storing and retrieving information in order to conduct air travel related transactions [1]. Most of the airlines have their own Self-booking Tools (SBTs) also referred to as Online Corporate Booking Tools (OCBTs) that provide an opportunity to their clients to make online reservations [2]. Any sale made through airline's offices directly or through their SBTs is referred to as direct sale. On the other hand, Global Distribution Systems (GDSs) connects airline offices with the offline and Online Travel Agencies (OTAs) [3]–[5]. GDSs book and sell tickets for multiple airlines. Any sale made through GDSs is referred to as sale through intermediaries.

Airlines opt for selling tickets through direct channels and also through intermediaries. However, in order to differentiate their reservation channel from others and to increase the direct sale, airlines have invested heavily in deploying a range of tactics, such as, featuring their web site URLs across the marketing and advertising communications, Web fares, reward mileage bonuses, and negative incentives for non-preferred booking channels [6]. In addition to this many airlines also dispose off their distressed inventory by providing last-minute sale discounts in order to secure incremental revenue, where airline offers its unsold inventory at heavily discounted prices before it perishes. This selling approach is adopted because it does not disrupt the existing distribution channels or retail pricing structure [7] and becomes a productive source of incremental revenue for the airline. The best part of this form of selling is that, although travelers enjoy highly discounted fares, they do not have to make predictions or face extremities in predicting specifics of their traveling itineraries. For example, Malaysian airline has launched last minute flights

in 2008 to increase the revenue and average load factor [8]. According to the managing director of Malaysia Airline, Datuk Seri Idris Jala “*the everyday low fares will create new demand for people who do not fly with Malaysia Airline*”, hence potentially increasing the average passenger load factor from 70% on each flight by filling up unsold seats. Besides all these tactics made by the airlines, however, more than 50% sale is done through GDSs [9]. Furthermore, researchers [10] reported that this type of direct selling at the last-minute could be very risky for the airline, since the potential travelers may prefer waiting for last-minute sales and not purchase in anticipation of heavy discounts [10]. Such a condition may put an airline in a very risky position with potential possibility of revenue loss. That is why this practice is substantially criticized by analysts and researchers, who refer to it as a vicious cycle of price degradation that can eventually destroy the airlines [11].

The second way to dispose-off distressed inventory is through opaque channels. The term ‘opaque inventory’ indicates selling of unsold travel inventory at heavily discounted price and it is called as being opaque, because some of the attributes of the service supplier such as, name in the case of airline or hotel etc., are kept hidden and only revealed to the traveler once the purchase has been materialized [12]. It is called opaque selling because of its innovative mechanisms for marketing and price discrimination [13], [14]. Opaque inventory selling is like a box, full of surprises and travelers who are interested in buying opaque inventory products are high in price sensitivity and low in specifics of travel plan. Thus this form of selling immediately captures the attention of travelers who would like to keep their travel expenses within limited budgets. As for the airlines, in order to minimize effect of price degradation on their revenue, accepted the role played by opaque selling intermediaries, so as to meet uncertain demand situations [15], [16].

But opaque selling has its own share of demerits. Firstly, opaque selling through intermediaries yields higher incremental revenue due to the uncertainty in demand, this means in case of no or little demand uncertainty, selling through the opaque channel will faintly increase profits for the airline, when comparing to direct selling channel [13]. Moreover, opaque channel on one side increase sales by attracting price-sensitive travelers who may otherwise not purchase, at the same time it also causes

reduction in sales of the transparent online SBTs of airlines and of the offline channels such as traditional travel agencies [12]. Earlier opaque selling intermediaries performed much better because there was little or no competition. However, today with the boom in Online Airline Reservation Systems (OARS), the price of discounted products may not vary much because potential buyers will be dispersed by different opaque selling intermediaries that will be standing against each other, striving to steal market share and forming a tacit collusion to keep prices high so as to make profits [12]. This will minimize incremental revenue of a particular airline [17]. In fact, with growing competition in opaque selling intermediaries, product differentiation has become difficult [18], so does branding and building customer loyalty [19].

While explaining the reasons, why people prefer intermediaries over online booking systems, researchers [20], [21] argued that earlier Business to Consumer (B2C) systems were not flexible as they work for simple closed requests, i.e. a request that can be directly mapped into formalized terms or predefined parameters, such as dates, airports, flights etc. Furthermore, these systems could break down for more complex requests, i.e. a request where customer is flexible with regards to attributes such as date and destination. Therefore, Malizia and Olsen [20] have recommended an information system between a customer and booking system to replace intermediaries. However, the solution recommended by these researchers only covers *pre-sale flexibility* issues. In other words, these systems provide flexibility only in terms of providing general information, which could be useful in taking decision with respect to pre-sale flexibility. So the question is if current SBTs are flexible enough? The term flexibility here should not only be related to the booking. In case of 'e-ticketing', problems arise when a traveler changes his/her mind or if the airline decides to make changes with regards to times, dates, destinations, after receiving a final confirmation of the booking. Therefore, actual replacement of human agent with a virtual intermediate system could be attainable in a post-sale flexibility scenario, if it is really supported in terms of 'flexibility'.

According to the Special Interest Group on Human-Computer Interaction (SIGCHI) of the Association for Computing Machinery (ACM) "*Human Computer*

Interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of the major phenomena surrounding them.” And within the study of HCI, human actions are processed by computers; as a result interaction occurs between the two. This means, humans make computer perform operations. Therefore, it is necessary to understand such an interaction in the contexts of flexibility as well. For that reason, flexibility can be discussed from these two different perspectives, i.e. (1) System’s Flexibility (Computer) and (2) Users’ Flexibility (Humans).

1.2 Problem Statement

In designing a flexible system, it is inadequate to understand and provide only the System Flexibility. It is equally important to also address the flexibility on the users’ side. Researcher [22] argued that even though internet is referred as a major technological innovation of today, its success heavily depends upon assimilation of customer expectations and preferences into the design and content of websites. In airline industries, Users’ Flexibility is more prevailing as most airlines adopted last-minute ticket selling strategy and opaque selling through which travelers can enjoy highly discounted fares at the price of their flexibility on, for instance, the traveling dates, time or itineraries. Previous Human Computer Interaction (HCI) researches, however, rarely addressed the users’ perspectives flexibility when designing systems interface for usability and flexibility of Online Airline Reservation Systems. Therefore, it is important to design self-booking tools in view of customers’ preferences, expectations and online usage behavior in order to increase the Perceived Usability of such systems.

Usability of a system can be evaluated on the basis of performance of its different functions and from literature it is noticeable that flexibility of a system is one of the guiding principles that provide support to achieve, develop or improve its usability. Therefore, it is very critical for the organizations to design flexible systems that are easy to use and can accomplish all the requirements by way of offering customizability. And one should not overlook, that flexibility is mirrored in functional requirements as well [23]. A system is considered usable if users can accomplish their

tasks easily. Similarly, a system is considered functional if it offers all the functions required by a user to perform their tasks [24].

Norman's philosophy [25] says that users are good in adapting to a system. However, research shows users' dissatisfaction with existing Online Airline Reservation Systems in terms of task completion [26]. Therefore, researchers are eager to find out ways for improving online usability of the systems, how users' Perceived Usability of a system is formulated by its flexibility functions [27]–[31]. In addition to techniques, methods and guidelines proposed for designing usable systems, HCI researchers have also long argued on the importance of human factors in designing and implementation of user-centred designs. According to Nielsen [32], *"users experience usability of a site before they have committed to using it and before they have spent any money on potential purchases"*. This indicates users' Perceived Usability in online digital environments is an important determinant for evaluating their satisfaction in the same environment. The existing literature can be divided into the following four research aspects where researchers currently are focusing upon to determine usability of online systems:

- Usability Perception by Performing Content Analysis
- Usability Perception through User's Internet Adoption
- Usability Perception based on Users' Preferences and Expectations
- Usability Perception based on Online Behavior of Web Users

This research uses a blended approach and combines the above four research areas to determine usability perception of the Online Airline Reservation Systems. It is important because customers' usability expectation and preferences from Online Airline Reservation Systems lacks research and empirical findings. Law and Leung [33] had emphasized upon the need to investigate expectations of airline customers that book their itineraries through their online self-booking tools. Moreover, the existing evaluation of online tourism websites is performed by researchers and not by customers. It leads to a dilemma and research gap that does not potentially address expectations of travelers. This research therefore examines travelers' expectations,

preferences and online behavior (User's Flexibility) and aligns that with designing of flexible Online Airline Reservation Systems (System's Flexibility) and users' as evaluators of the online systems to determine its usability (Perceived Usability).

1.3 Research Aims and Objectives

This research aims to provide a framework for designing a more flexible Online Airline Reservation Systems through investigating the associations between System's Flexibility, Users' Flexibility and Perceived Usability of Online Airline Reservation Systems. This was an exploratory approach and would lead to a better understanding of the interrelationship between System's Flexibility, Users' Flexibility and Perceived Usability of Online Airline Reservation Systems; and provide a basis for future studies to formally develop design guidelines and/or usability metrics in the flexibility context. To aid this aim the following research objectives are defined to address the corresponding research questions/hypotheses:

1. To assess user needs (System's Flexibility and Users' Flexibility) associated with Online Airline Reservation Systems.

The research questions are:

RQ1: What are the issues with flexibility of Online Airline Reservation Systems, whether or not flexibility is one of the reasons for users not using such systems?

RQ2: To what extent flexible users can compromise with service quality attributes of Online Airline Reservation Systems?

RQ3: How users' satisfaction with an existing SBTs is rated against their choice of OTA feature and reflected in their integration assessment of the same for making SBTs more flexible Online Airline Reservation Systems?

2. To propose a framework for designing more flexible Online Airline Reservation Systems while classifying users on the basis of their Flexible Traveling Behavior.

The research questions are:

RQ4: How users' perception on factors influencing Flexible Traveling Behavior and Flexible Online Airline Reservation Systems is determined?

RQ5: How to classify Users' on the basis of their Flexible Traveling Behavior into High, Medium and Low flexible and how to investigate interrelationships among Users' Flexibility, System's Flexibility and Perceived Usability of existing Online Airline Reservation Systems?

3. To study the interrelationship between System's Flexibility, Users' Flexibility and Perceived Usability of Online Airline Reservation Systems and to determine the Perceived Usability of the existing and proposed systems.

The research questions are:

RQ6: How do service quality attributes of airlines and external variables jointly predict flexible behavior of travelers?

RQ7: How does user Perceived Usability with the existing and the proposed system differs?

RQ8: Is there a multivariate main effect of user's Flexible Traveling Behavior (High, Medium and Low) on effectiveness, efficiency and satisfaction of the proposed system?

1.4 Research Methodology

The methodology of this thesis consists of three phases which are described below:

- **Phase I:** Assessing User Needs (System's Flexibility & Users' Flexibility)

Phase I was designed to achieve the 1st research objective. The existing Online Airline Reservation Systems were used to assess the System's Flexibility and Users' Flexibility. In the existing Information Systems research and literature, no study has been found to address consumer behavior on opaque selling with

respect to Online Airline Reservation Systems. Therefore, this phase will help to explore the small but growing literature in designing of Online Airline Reservation Systems by modeling upon flexible behavior of travelers.

Three pilot studies were conducted in this phase as shown below:

1. A study to investigate issues with flexibility and if flexibility is the reason for not using Online Airline Reservation Systems.
2. A study to investigate users' flexible behavior in terms of compromising on the service quality attributes of an airline.
3. A study to examine if integration of OTAs features can make SBTs more Flexible Online Airline Reservation Systems?

- **Phase II: Classification of Users (Interrelationship Testing of Variables)**

Phase 2 was designed to attain the 2nd research objective. This phase intends to carry out an extensive relationship testing of variables and their sub-measuring constructs so as to evolve a framework for designing of Flexible Online Airline Reservation Systems. Two detailed studies were conducted in this phase with the following study objectives:

1. A qualitative enquiry to explore the concept of users' perception on factors influencing Flexible Traveling Behavior and Flexible Online Airline Reservation Systems.
2. A study to classify Users' on the basis of their Flexible Traveling Behavior (High, Medium, Low) and to investigate interrelationships among System's Flexibility, Users' Flexibility and Perceived Usability of existing Online Airline Reservation Systems.

- **Phase III: Case Study (Testing the Framework)**

Phase III of this study is related to a design case study and the corresponding analysis to conquer the 3rd research objective. Participants were requested to complete the usability evaluation of the existing and proposed interfaces.

Quantitative technique was used to analyze the data collected in the context of System's Flexibility, Users' Flexibility and Perceived Usability of the systems.

A detailed research methodology is presented in Chapter 3.

1.5 Scope of Research

Global Distribution Systems allow users to make reservations, from hotel booking to car rentals, from railway reservation to e-ticketing. However, the scope of this research is limited to Online Airline Reservation Systems only, as the research focuses upon designing a more flexible Online Airline Reservation Systems in lieu of users' flexible behavior. Thus, the scope of this research is further limited to the Malaysian perspective.

Forrester research [33], estimates seventy million consumers searching online for travel plans in July 2006, thus making online travel bookings the single largest component of e-commerce. Different users have different needs, interests and wishes to be served and system's effectiveness, efficiency and satisfaction may vary from one user to another based on their usability perception. For some users a system may be very effective but this may not be true for all. Therefore, usability of any website cannot be improved without considering consumer intend or user behavior. Furthermore, clear understanding of consumer intent and behavior in the case of online airline ticket shopping and elsewhere cannot be achieved without considering the factors that affect purchase decisions [34]–[36]. The reason is selling products online are very different from selling in physical market and this requires a clear understanding of online customer interest due to absence of face-to-face interaction with customers [20], [21], [37]. Internet marketing strategies can be adjusted if cyber marketers know what the consumers want and how they reach their decisions. Similarly, such an understanding will help Web designers to develop sites making that are not only popular but also flexible and effective for sales [38], [39].

The anticipation of travelers for low fares is an extremely important concern, that airlines are faced with every day. Anticipation of travelers for low fares, gives an idea

about their traveling behavior, which is '*the extent to which a traveler anticipates for a low fare*', indicating the extent to which '*a traveler is ready to compromise on flying conditions*', and thus becoming flexible in accepting what is being offered to them by an airline. As discussed in Chapter 2, Section 2.3.1, airlines are not in a strategic position to offer low cost fares directly to their customers for selling left over inventories, due to a number of potential threats to their revenue generation. Therefore, the only business model that addresses this concern is opaque selling by OTAs, and scope of this research is narrowed down to examining the flexible behavior of Malaysian travelers in order to design more flexible Online Airline Reservation Systems that may increase the Perceived Usability of Online Airline Reservation Systems.

1.6 Research Contributions

The first contribution of this research is the development of a framework that could be used for further studies and to design more flexible Online Airline Reservation Systems. The framework is a general framework that can be applied to different reservation systems; however, this research particularly addresses the airline reservation systems.

The second contribution is towards the development of users' flexibility measuring scale. The non-availability of an absolute scale to measure flexibility turns the investigation into a cumbersome effort for researchers and practitioners. It is difficult to even make any rough assumptions about the extent to which the users would like to have additional flexibility features in online reservation systems. Therefore, this research builds on previous and ongoing work within the disciplines of *Human Computer Interaction* by introducing psychometric scales to measure users' flexibility in terms of compromising on service quality attributes of an airline.

The third contribution of this research is within the area of *Operational Management*, as it introduces a new approach of reservations to increase the Passenger Load Factor (PLF). Under utilization of the resources, such as, air plane capacity is one reason of low PLF and increased number of flights. Using traditional

airline reservation systems, airlines either cancel the flight at 11th hour or send flight with minimal profit margin, even if they receive lesser bookings in any particular flight. One solution to address this concern is by leveraging upon travelers' flexibility. In this research it is proposed to send flights fully occupied, which in turn could reduce the number of flights that actually take-off per week.

The fourth contribution of this research is to add up in the growing literature. The concept of SBTs for disposing off their opaque inventory directly has not been adequately considered in *Information System Research and Literature*. The concept requires extensive research especially in academic discipline [40] and as highlighted by Jerath *et al.* [41] a number of studies have focused upon airline revenue management systems, however attempts to empirically verify those findings are a few. Furthermore, the existing opaque selling literature lies at the intersection of consumer behavior and revenue management operational strategies [40]. However no study has been found to address consumer behavior on opaque selling with respect to Online Airline Reservation Systems as most recent papers as well as researches fall within the marketing domain [40]. This research therefore contributes to the small but growing literature in designing of Online Airline Reservation Systems by modelling upon flexible behavior of travelers.

The fifth contribution of this research is the IS theory, based on empirical findings and analysis in support of the proposed framework for Flexible Online Airline Reservation Systems. Theory building from case studies is considered to produce novel theory, and is testable with constructs that can be readily measured and hypothesis that can be proven false.

The sixth contribution of this research is the development of a prototype in terms of proposed Graphical User Interfaces (GUI) to handle flexible and inflexible travelers differently. If a system provides ranges of dates as flying and source destination options at different fares, flexibility of the system is enhanced in its Perceived Usability in the eyes of the flexible travelers.

Finally, this research provides empirical results of the real case studies on the existing and proposed system.

1.7 Organization of the Thesis

This dissertation is divided into the following 6 chapters:

Chapter 1 provides a research overview. It gives the research background while defining the problem statement, research aim and objectives, research methodology, research scope and contribution. Finally, it outlines the overall chapters of the dissertation.

Chapter 2 presents the literature review. This chapter introduces flexibility of Online Airline Reservation Systems from two different perspectives (i.e. System's Flexibility and Users' Flexibility) and also provides a conceptual linking between the two. Furthermore, different aspects of Perceived Usability have been discussed in this chapter in order to provide a conceptual linking between the usability of Online Airline Reservation Systems and Flexible Traveling Behavior of the travelers.

Chapter 3 describes the research methodology of the thesis. The overall methodology is divided into three phases. Phase I addresses user needs (System's Flexibility and Users' Flexibility), Phase II gives classification of users and interrelationship testing of variables and, Phase III provides a case study.

Chapter 4 reports the statistical analysis of the research. It includes results of different pilot studies and the case study. It follows the research questions to organize the results obtained through corresponding hypotheses.

Chapter 5 presents the discussion of the dissertation. This chapter follows the same pattern by discussing and elaborating facts related to individual research questions reported in Chapter 4. Moreover, recommendations for the proposed Flexible Online Airline Reservation Systems are also discussed in this chapter.

Chapter 6 summarizes the thesis. It highlights the research and emphasizes on the importance of the proposed framework. Moreover, major findings of the work and recommended directions for the future work are also presented in this chapter.

CHAPTER 2

LITERATURE REVIEW

2.0 Chapter Overview

In this chapter System's Flexibility, Users' Flexibility and Perceived Usability of the Online Airline Reservation Systems is presented. Section 2.1 is dedicated to explore flexibility from two different perspectives (i.e. System's Flexibility and Users' Flexibility) and to find out the conceptual link between the two. Section 2.2 covers different aspects of usability perception and provides a conceptual link between the usability of Online Airline Reservation Systems and Flexible Traveling Behavior of the travelers. Section 2.3 is devoted to explore the relationship between flexibility and usability and also to study the role of opaque selling in System's Flexibility and User's Flexibility. Section 2.3 presents the summary of the chapter.

2.1 Flexibility and Online Airline Reservation Systems

Flexibility of a system is one of the guiding principles that provide support to achieve, develop or improve its usability. It is very critical for the organizations to design flexible systems that are easy to use and can accomplish all the requirements by way of offering customizability. Given the importance of internet shopping as a source of income for the airlines and high user demand, in-depth research is required.

2.1.1 Flexibility Concepts

The notion of flexibility has been addressed in many disciplines and from many different perspectives. The oxford university's dictionary on Business and Management defines flexibility as "the ability to adapt an operating system to respond

to changes in the environment” [42]. In case of manufacturing, one may distinguish eleven different classes of flexibility: machine, material handling, operation, process, product, routing, volume, expansion, program, production and market flexibility [43]–[45]. In the discipline of systems engineering, the flexibility of a system is understood as “the ability to respond to change” [46]. Product design literature defines flexibility “as the ability of companies to frequently upgrade their products to meet the rapidly changing technologies” [47], [48]. Each of the above definition defines flexibility in a different perspective, but the fundamental meaning of this term remains consistent across all definitions which: “able to flex.”

As defined by the Special Interest Group on Human-Computer Interaction (SIGCHI) of the Association for Computing Machinery (ACM) “Human Computer Interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of the major phenomena surrounding them.” In HCI, human actions are processed by computers; as a result interaction occurs between the two. This shows that humans make computer perform operations, therefore, it is very important to understand human computer interaction in the context of flexibility as well. Hence, flexibility can be discussed from these two different perspectives, i.e. (1) System’s Flexibility (Computer) and (2) Users’ Flexibility (Humans) as shown in Figure 2.1.

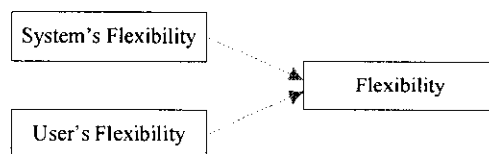


Figure 2.1: Two Different Perspectives of Flexibility

2.1.1.1 *System’s Flexibility*

Within the HCI discipline, System’s Flexibility is referred to its ability to respond to internal or external changes. However, the ambiguous characteristic of word “flexibility” [46] has forced authors to explain flexibility differently as shown in Table 2.1.

Human computer interaction studies are conducted to *develop* or *improve* the safety, utility, effectiveness, efficiency, usability, appeal of the systems that include computers as shown in Figure 2.2. Of which, Usability of the systems is described by researchers as a “measure of the ease with which a system can be learned and used, its safety, effectiveness and efficiency, and attitude of its users towards it” [49]. While, ISO defines Usability as “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use” (ISO 9241-11). The principles that provide support to achieve, develop or improve Usability of the system include, (1) Learnability, which is the ease with which users can use the system effectively, (2) Robustness, which is the level of support provided to the user to achieve its goals and (3) Flexibility, which is basically multiplicity of ways the user and the system exchanges information.

Table 2.1: Definitions of Flexibility in the Context of System Engineering

| Author | Definition of Flexibility | Reference |
|-----------|---|-----------|
| Nilchiani | We define flexibility as the ability of a system to respond to potential internal or external changes affecting its value delivery, in a timely and cost-effective manner. Thus, flexibility is the ease with which the system can respond to uncertainty in a manner to sustain or increase its value delivery. It should be noted that uncertainty is a key element in the definition of flexibility. Uncertainty can create both risks and opportunities in a system, and it is with the existence of uncertainty that flexibility becomes valuable. | [50] |
| Saleh | Flexibility should be sought when: 1) the uncertainty in a system's environment such that there is a need to mitigate market risks, in the case of a commercial venture, and reduce a design's exposure to uncertainty in its environment, 2) the system's technology base evolves on a time scale considerably shorter than the system's design lifetime, thus requiring a solution for mitigating risks associated with technology obsolescence. | [51] |
| Ross | The only difference between flexibility and adaptability is the location of the change agent with respect to the system boundary: inside (adaptable) or outside (flexible). Of course the system boundary could be redefined, changing a flexible change into an adaptable one, or vice versa. The fungible nature of the definition is often reflected in colloquial usage and sometimes results in confusion. If the system boundary and location of change agent are well-defined, confusion will be minimized. | [52] |

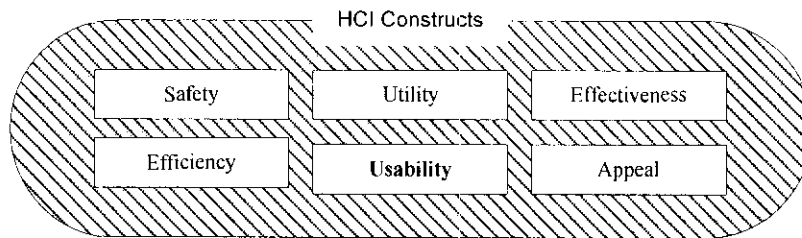


Figure 2.2: Different Elements of Human Computer Interaction

Of the three principles, Flexibility is related to taking input/output in different forms and examined with respect to (1) Dialogue initiatives, (2) Multi-threading, (3) Task migratability, (4) Substitutivity and (5) Customizability as shown in Figure 2.3. Customizability refers to adaptability of interfaces to suit different needs, and it is achieved by way of (i) adaptability, where users can adapt the user interface, (ii) adaptivity, where the user interface can be adapted by the system and (iii) personalization, where the user interface is tailored towards the individual user. While system driven interaction hinders its flexibility, user-driven interaction is considered to be strongly favourable.

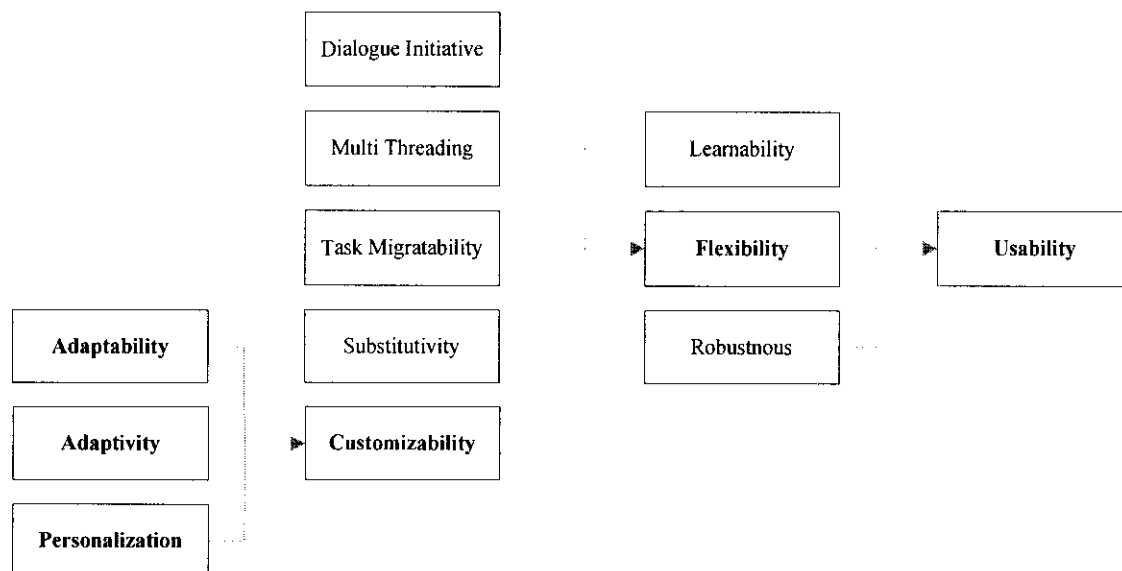


Figure 2.3: Flexibility as the Multiplicity of Ways for Information Exchange

2.1.1.2 Users' Flexibility

The User's Flexibility is nothing but users' ability to rapidly change from one course of action to another, i.e. "flexible behavior", and it is referred as a hallmark of human

cognition system [53]. Webster's Dictionary defines cognition as “the act or process of knowing in the broadest sense; specifically, an intellectual process by which knowledge is gained from perception or ideas”. Empirical research into cognition is usually scientific and quantitative, and involves formation of mental models to describe or explain certain behaviors. In context of flexible behavior of users, human cognition system may thus be examined from the perspective of cognitive psychology. As mentioned earlier, Human-Computer Interaction (HCI) research is intended to explain interaction between humans and the computer technology. And in order to provide a scientific explanation to human behavior (e.g. user interface design, information visualization, etc) many principles, theories and concepts from cognitive psychology are deployed in HCI [54]–[60] such as Perception, Categorization, Memory, Knowledge Representation, Language and Thinking as shown in Figure 2.4.

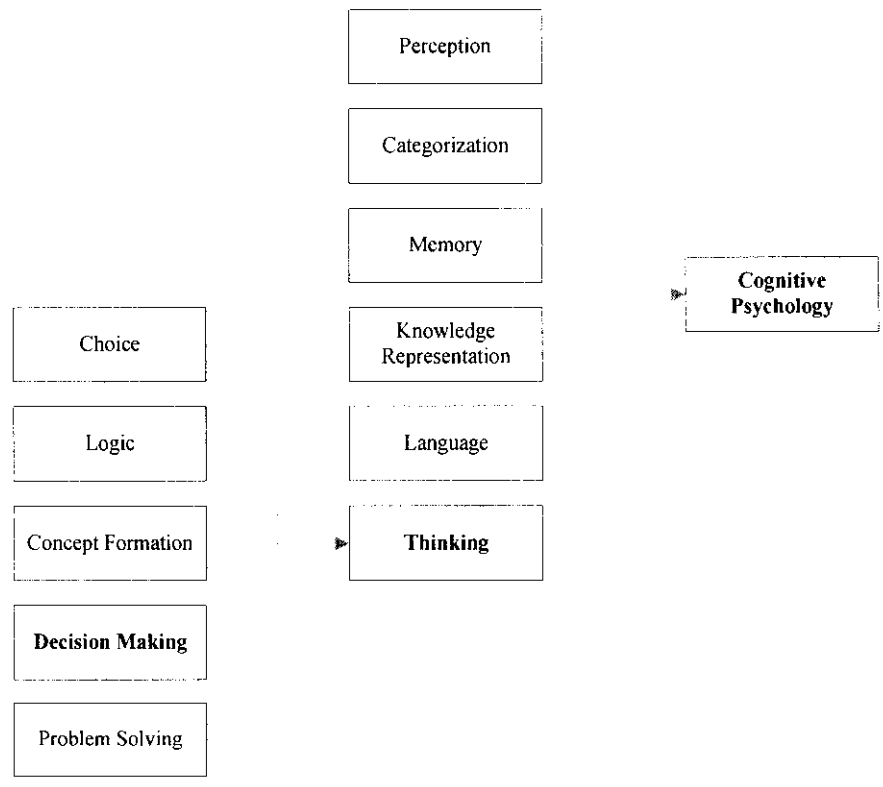


Figure 2.4: Building Construct of Cognitive Psychology

Thinking refers to any intellectual or mental activity resulting in ideas or arrangements of ideas and within the context of HCI, thinking simulates human behavior, which is eventually translated as an action taken on part of users, in the form of making choices, performing logical operations, formation of concepts, problem solving and decision making [61]. For understanding flexible human

behavior, decision making is an important reflection of users thought process. Decision making is a mental process which results in selection of a course of action among several alternatives. At the end of every decision making process, an output is produced in the form of a final choice or selection, which can be in the form an action, or an opinion of choice. Decision making process is an active research area since it examines decisions of users in context of their unique set of needs and preferences, therefore, reflection of users' flexible behavior can be seen in the decisions they make [62], [63].

2.1.1.3 Conceptual Linking between System's Flexibility and Users' Flexibility

In order to understand users' flexible behavior, it is first important to understand the contexts that govern users' behavior towards being flexible. In case of System's Flexibility, users interact with computer systems in order to accomplish tasks. While the System's Flexibility is reflected in its customizability features, therefore, developing an understanding of system's customizability in terms of affecting users flexible behavior, requires a science base in the form of systematic knowledge of what governs user's flexible behavior' and influencing upon their decision making process as shown in Figure 2.5. Thus, three variables have been identified in this basic conceptual framework: (i) System's Flexibility, (ii) Users' Flexibility and (iii) System's Usability.

From literature review, it is found out that users' flexible behavior is reflected in their decision making process, while System's Flexibility is translated in its customizability features.

1. System's Flexibility has a linear relationship with User's Flexibility due to the following assumptions:
 - A flexible system (customizable) can reinforce users' flexible behavior by influencing upon their decision-making, even if they were inflexible or partially flexible initially [25].

- On the contrary, if a user is flexible with respect to making decisions, it cannot still reinforce System's Flexibility through customizability, even if it was inflexible or partially flexible, initially.
2. System's Flexibility is one of the principles that provide support to achieve, develop or improve usability of the system. System's flexibility thus has a linear relationship with System's Usability.
 3. Users' flexible behavior in terms of their decision making influence upon the usability of a system. Thus Users' Flexibility has a linear relationship with System's Usability.

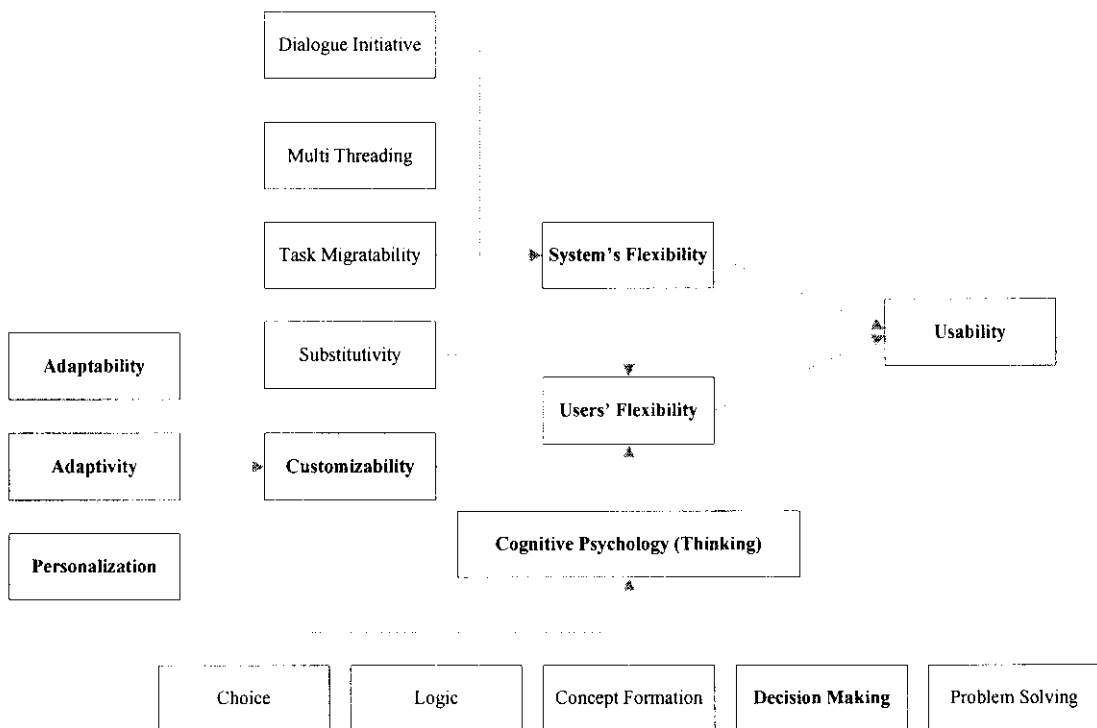


Figure 2.5: Conceptual Linking between System's Flexibility and Users' Flexibility

From literature it is concluded that flexibility can be discussed from two different aspects, one from System's perspective (Computers), and second from User's perspective (Human). System's Flexibility translates into its customizability in achieving the defined usability objectives of the system which are effectiveness, efficiency and satisfaction.

Likewise, in context of User's Flexibility, this section concludes that different users may have different needs, interests and wishes to be served and system's

effectiveness, efficiency and satisfaction may vary from one user to another based on their usability perception. For some users a system may be very effective but this may not be true for all. This drives the need of integrating cognitive ergonomics into the framework, to understand Users' Flexibility in designing of systems. Moreover, from literature it is found that Users' Flexibility is reflected in their decision making behavior. Further elaboration and validation of the conceptual linking between System's Flexibility, Users' Flexibility and Usability can be found in the methodology chapter Section 3.2.1.

2.1.2 Airline Reservation Systems

Airline Reservation Systems (ARS) keep record of airline schedules, fare tariffs and passenger reservations. ARS are developed to enable productive and effective flight reservations for an airline. ARS eventually evolved into the Computer Reservation System.

2.1.2.1 Computer Reservation Systems

Computer Reservation Systems (CRSs) are the computerized systems used for storing and retrieving information such as, airline reservation systems, car rental systems and, hotel reservation systems [1].

CRSs became increasingly popular due to their immense potential in handling of reservations and companies could foresee an increase in their yield matrices. However, CRSs offer advantages but the strength of their positivity depends upon how well and at what level systems have been integrated [64].

CRSs are equipped with enhanced functionalities and features that provide companies with an integrated one stop solution to manage sales, customer relationship management, marketing plans, resource planning and personalized customer care and attention. With these features, CRSs help in processing reservations and at the same time support decision making processes.

The development of CRSs started at the beginning of the 60s when the first electronic travel booking was launched by Semi-Automated Business Research Environment (SABRE). Subsequently, American Airlines and IBM joined hands with SABRE to launch first of many airlines owned and operated CRSs.

Initially, these systems were used at airlines' basic and internal reservation centres, but its true potential was realized quickly and travel agencies grabbed the opportunity for its deployment. It helped travel agencies immensely in terms of providing accurate schedules to travelers, fares, instant information on availability of seats and extended efficiency internally as well with respect to strengthening the distribution channels. However, CRSs came with their share of drawbacks as well. CRSs did help in reducing the costs of travel agencies when compared to manual reservation systems that were based on telephone confirmation and checking [65], however, they were still criticized as "inflexible dinosaurs" since they were not adaptable enough to meet growing business demands, that requires robustness with regards to offering services and additional features for reducing high distribution costs in a more flexible manner [1]. Airlines, being the true originator of CRSs enjoyed more competitive edge than problems that had arisen due to inflexibility of CRSs. Especially when comparing with travel agencies, airlines were in a more control situation with respect to scheduling of flights and could even influence upon market share. For example, in 1985, U.S. travel agency sales had risen to \$54 billion, which was more than nine in 10 agencies with sales greater than \$1 million and had deployed CRSs. Travel Agency revenue had surged 400% over the same period, while agency employment increased by only 20% [9].

In early nineties, with the consortium of four large CRSs companies, Global Distribution Systems (GDSs) had emerged into the scene. It is important to mention here that CRSs are not to be confused with GDSs since they are electronically connected to one another. CRSs run on mainframes, minicomputers or microcomputers and are connected through data communication links to terminals within various branches of the company for bookings. On the other hand, GDSs are the systems that book and sell tickets for multiple airlines and use internet gateways to allow users for making reservations, from hotel booking to car rentals, from railway reservation to e-ticketing as shown in Figure 2.6. The emergence of GDSs and their

connectivity with CRSs has brought hundreds of thousands of travel agents and other distributors with thousands of suppliers on one single platform, hence resulting in improved efficiency, facilitating control and rapid response time to both customers and management [3]–[5]. This is particularly true in case of global tourism industry since it heavily deploys CRSs to process their reservations through GDSs to perform basic functions of reservation process, such as product presentation, reservation, fare quote & ticketing and additional services [1]. This is reflective in tourism or hospitality industry where over the years, electronic reservation systems have provided greater operational benefits in terms of yield management, e-marketing strategies as well as productivity benefits [64]. Likewise travel agencies through GDSs enjoy the freedom to make reservations directly from their terminal with any airline, on any continent. This saves much of their coordination time and effort that is required in settling negotiations.

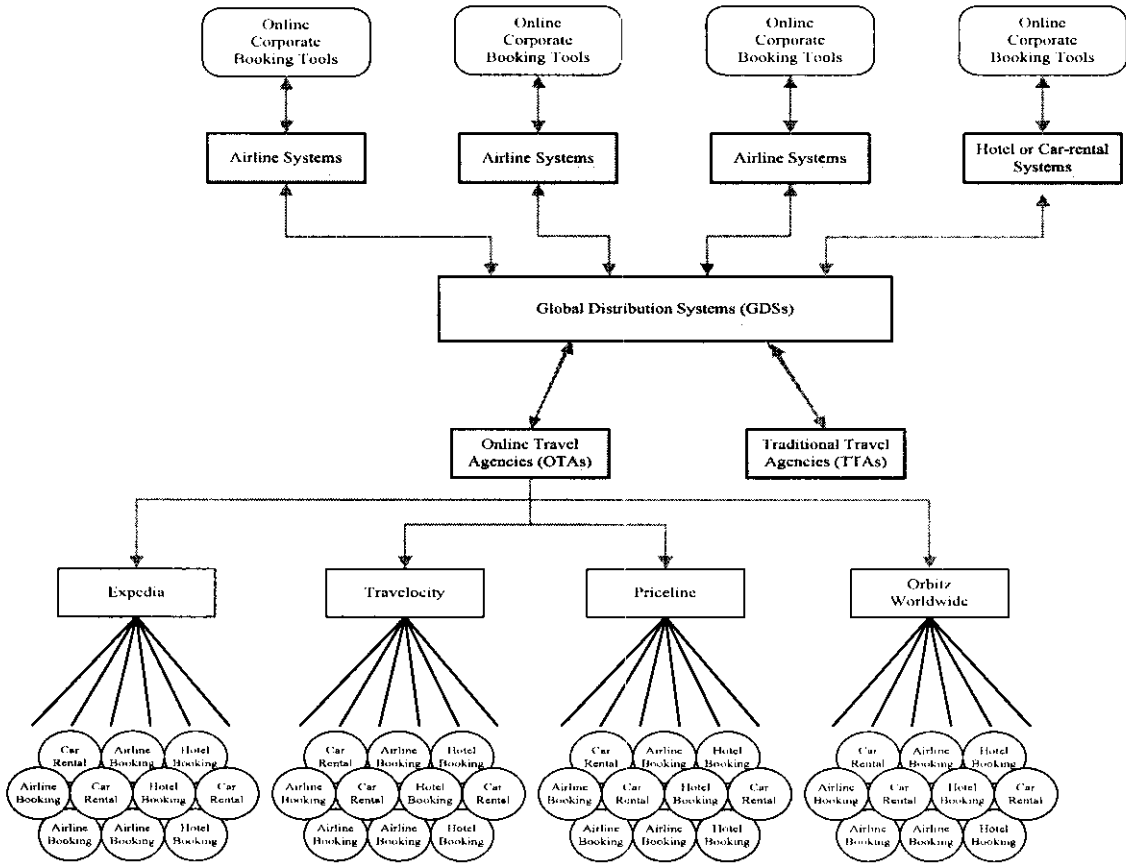


Figure 2.6: Distribution Channels for Airline Reservation Systems

As mentioned earlier, GDSs has brought hundreds of thousands of travel agents and distributors from different countries and continents in nexus, it has thus acquired

the status of the nervous system in global reservation system. The GDSs generated more than \$9.6 billion in revenue and more than 1.1 billion transactions in 2008, just over 2,100 transactions per minute. The infrastructure of each GDS can support volumes far greater than this [9] since airlines and other distributors that are in nexus with GDSs and provide access to schedule and fare to travel agencies – both offline and online [9].

2.1.2.2 Self-Booking Tools vs. Online Travel Agencies

A travel agency, also called a travel bureau, is defined as business that attends to the details of transportation, itinerary, and accommodations for travelers [2]. Travel agency acts as an agent, just like a retail storefront that books and sells tickets on behalf of many airlines. Traditional travel agencies hold a large portion of travel booking industry, due to a number of factors such as, face to face service to customers, provision of personalized services and realistic solutions for providing reservation arrangements, comfort in country of destination, and special packages or promotional deals. On the negative front, traditional travel agencies are blamed for practicing restrictive practices such as racking whereby they promote traveling brochures of those companies only who pay them highest commission. The traveler is unaware of possible alternative options and considers them to be the only once or best option available.

On the contrary, an Online Travel Agencies (OTAs) operate through a travel website on the World Wide Web, dedicated to providing updated travel related information, guidance and travel reviews [2]. The travelers interact with the virtual interface of the online travel agency which allows them to search and book their travel plans. The online reservation process does not involve personalized attention on behalf of online travel agency and still this does not seem to be a matter of concern for travelers. According to Forrester research [33], approximately seventy million consumers searched for travel plans online in July 2006, thus making online travel bookings the single largest component of e-commerce. This also makes online travel agencies an important part of the overall equation for flexible reservation systems for airlines. The recent growing acceptance of online travel agencies is credited to their

meta-search engines feature that provides fare aggregators to travelers. Meta-search engine as the name indicates conducts search across multiple independent search engines and gets live availability of flights through “screen scraping” process, which crawls through the airline websites and extracts content by way of human-readable HTML feed. The content extracted from various airlines website is then displayed to the users in the form of fare aggregation, i.e. all results on one screen. According to PhoCusWright Report 2009 [9], the overall share of online travel agencies in US travel market alone was 13% in 2008 and projected to touch 16% in 2011 as shown in Figure 2.7. On the contrary, the share of conventional traveling agency was 33% in 2008 and is projected to suffer a decline 3% in 2011. This is further justified from Yahoo Travels’ claim which says that 76% of all online travel purchases occur as a result of search function. Jupiter Research in its Travel Consumer Survey published in 2004 pointed out that “nearly two in five online travel consumers say they believe that no one site has the lowest rates or fares.” This therefore created a niche research dimension for OTAs to look at different ways for integrating additional features into their reservation system so as to optimize aggregate travel search and provide lowest rates from multiple travel sites, to eliminate travelers’ verification need from site to site.

It is also interesting to note from the chart as shown in Figure 2.7 that supplier branded websites also will experience an estimated increase of 3% in 2011. Suppliers branded websites are Self-Booking Tools (SBTs) providing direct linkage of the passenger with the airline industry. They provide carrier-direct bookings facility to travelers, without having them going through the hassle of other intermediaries. These booking are just like going to the reservation office of a specific airline physically and are popular among travelers who remain loyal to their favourite brands of airlines and prefer to travel only through them. Another strong reason for travelers to opt for SBTs is their ability to earn flying rewards, which ultimately makes them more loyal towards a particular brand of airline. Likewise, in order to differentiate their reservation channel from others, airlines have started to invest heavily in their online SBTs capabilities, offering more features and convenience for travelers such as tracking, managing and redeeming air miles. Moreover, airlines also invest massively on branding of their image and securing loyalty of customers by offering reward

mileage bonuses. In addition to this some airlines have gone to the extent of imposing fees on GDS bookings for their carrier. For example Lufthansa airline in its Preferred Fares Program launched in 2008, imposed fees of €4.90 per ticket for travel agencies in Austria, Germany and Switzerland that made reservations through GDSs [6].

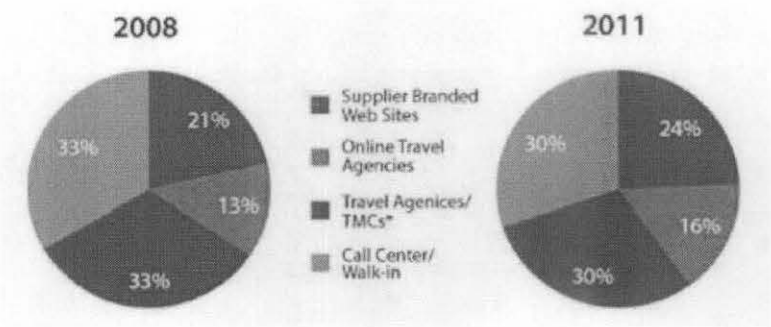


Figure 2.7: U.S. Travel Market by Channel, 2008 and 2011 (Projected)

Source: PhoCusWright U.S. Online Travel Overview Ninth Edition

On the contrary, OTAs cash upon the nexus of CRSs and GDSs and act as a central hub for price differentiation and comparison. They provide discounted fares and 24 hours service. Their fixed costs are lowest, since there is no requirement as such to set up physical offices with state-of-the-art facilities at prime locations. Their success is derived by innovational strategies, as a result they hold lion’s share, 50% (average 2006, 2007 & 2008) in the travel industry.

A comparison chart on SBTs and OTAs is presented and discussed as shown in Table 2.2. The table presents innovative attributes and function that have contributed immensely towards the popular acceptance of OTAs over Airlines’ SBTs and are also widely common among travel companies in recent years [15], [16]. Functions such as product presentation, reservation, quoting & ticketing, post-sale services, low fare notification, dynamic packaging and flexible alternative date search are also performed by SBTs, however, OTAs get an edge over SBTs in terms of providing matrix display, opaque fares, alternative airport search and hotel search.

Table 2.2: Comparison Chart on Offered Features by SBTs and OTAs [1], [9]

| Feature | Description | SBTs | OTAs |
|---|--|------|------|
| Product presentation | is the presentation of services or products in all aspects of travel industry. | ✓ | ✓ |
| Reservations | is used for making reservations for the offered services and products. | ✓ | ✓ |
| Quoting & ticketing | relates to providing fare quotes and generate receipts for the given services and products. | ✓ | ✓ |
| Additional services | post-sale features and user prompting for their guidance throughout the reservation process . | ✓ | ✓ |
| Matrix display | using this feature, users may click on any cell within the matrix to sort airfare search results by price, airline and number of stops. It was initially introduced by Orbitz but these days it has become a standard for all OTAs. | | ✓ |
| Alternative airport search | allow travelers to search across multiple departure and arrival airports so as to find the lowest possible fare or most convenient schedule. | | ✓ |
| Hotel search, results display & sorting | <p>this feature allow travelers to display, sort and compare options from hundreds of possible hotel search results.</p> <ul style="list-style-type: none"> • address or landmark search and sorting • map-based search results display • traveler reviews included with the results • multiple sorting options, including price, star rating, brand, guest rating and amenities | | ✓ |
| Opaque fares | were initiated by Priceline’s Name Your Own Price airfare bidding model. In this feature users are offered heavily discounted tickets with not specified time or flight number. They are usable at the discretion of the airline. | | ✓ |
| Low-fare notifications | a feature in which customers are intimated via email to opt for specific promotional deals. | ✓ | ✓ |
| Flexible & alternative date search | allow users to search and compare flight options across multiple departures and return dates so as to find the lowest possible fare. | ✓ | ✓ |
| Dynamic packaging | initially made famous by Expedia where users are allowed to shop for multiple components in a single search, such as “Flight and Hotel”. | ✓ | ✓ |

Matrix Display – Orbitz is the pioneer in OTAs who initiated the concept of matrix display. This feature allows users to click on any particular airline offered fare to see the further details such as departure and arrival timings. As shown in Figure 2.8, there are number of airfares from New York to Los Angles offered by multiple carriers on the specified dates e.g., departure: 29 December 2010; arrival: 29 January

2011. In the matrix, carriers are organized in multiple columns, stops in multiple rows and the airfares are placed against airlines and stops.

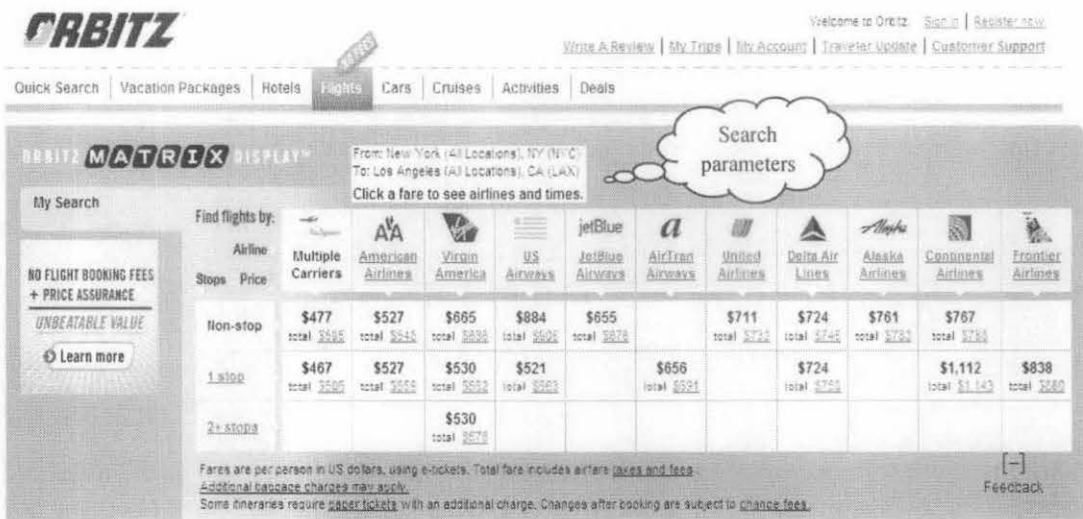


Figure 2.8: Lowest Airfare Search Results through Matrix Display [66]

Alternate Airport Search – Alternate airport search feature helps users to find the lowest possible fare or most convenient schedule across multiple departure and arrival airports. Using this feature as shown in Figure 2.9, one can click on the checkbox “include nearby airports” to see the search results on the specified as well as nearby airports. Orbitz provides the flexibility of choosing “include nearby airports” for source and destination airports.

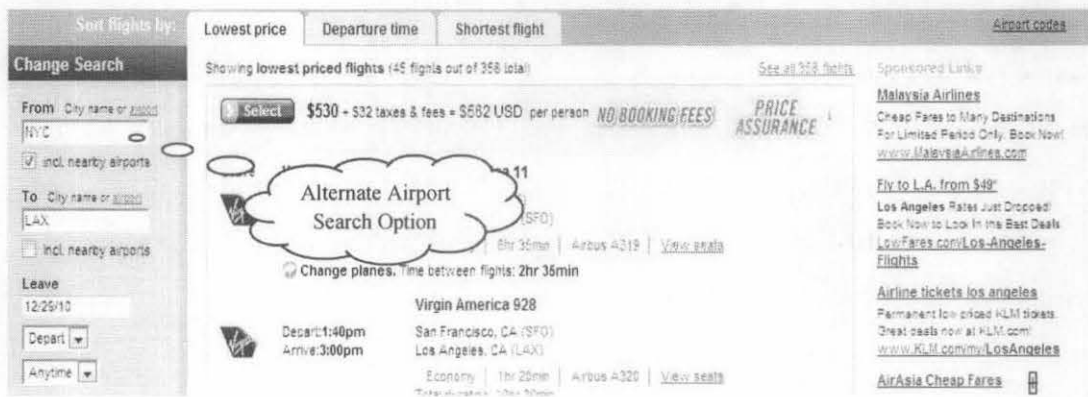


Figure 2.9: Alternative Airport Search to Find the Lowest Possible Fare [66]

Hotel Search – OTAs offer hotel search feature that provides the option to display, sort and compare hundreds of possible hotel search results. As shown in Figure 2.10, this feature allows address or landmark search and sorting, map-based

search results display, traveler reviews included with the results and multiple sorting options, including lowest price, distance, star rating, brand and amenities.

The screenshot displays the Orbitz hotel search interface. At the top, search filters are set for Los Angeles International, California, with a check-in date of Wednesday, December 29, 2010, and a check-out date of Saturday, January 15, 2011. The search is for 17 nights and 1 room for 1 guest. A 'Change search' button is visible. Below the filters, a banner promotes Orbitz's 'Price Assurance + Low Price Guarantee + No Orbitz hotel change or cancellation fee' policy. The main section shows '327 matching Los Angeles International hotels'. A 'Sort by' dropdown menu is open, showing options: 'Best Values', 'Lowest Price', 'Distance', 'Star Rating', and 'Hotel Name'. A 'Map' button is also present. On the left, a map of Los Angeles is shown with hotel locations marked. On the right, two hotel listings are visible: 'Custom Hotel LAX, A Joie de Vivre Boutique Hotel' and 'Four Points by Sheraton Los Angeles International Airport'. Annotations with thought bubbles highlight 'Multiple Sorting Options' (pointing to the sort menu), 'Map-based Search' (pointing to the map), and 'Travelers Reviews' (pointing to the review section of the hotel listings).

Figure 2.10: Hotel Search, Results Display & Sorting to Compare Options from Hundreds of Possible Hotels [66]

Opaque Fares – Opaque selling intermediaries have become an established distribution channel for the travel industry [17]. This form of opaque selling came into limelight in 1998 when priceline.com's, *Name-Your-Own-Price* emerged with an opaque selling business model where both the itinerary information and the identity of the airline carrier were hidden from the traveler, until the bid was purchased as shown in Figure 2.11. Next, major U.S airlines established Hotwire to compete in the opaque segment of intermediaries. However, it came up with a different opaque selling business model, which was not based on bidding mechanism but rather posting a price for an offer that concealed key itinerary information and airline identity as shown in Figure 2.12 and 2.13. Since then many opaque selling intermediaries have appeared in the international travel market, such as cheaptickets.com, onetravel.com etc. and popularized this selling mechanism [67], [68]. However, the common aspect of all such opaque selling intermediaries is that they are based on hiding descriptive attributes of the service to be provided; as a result travelers cannot fully predict the ultimate service provider or the airline.

Name Your Own Price[®] and Save up to 40% on Flights¹

New York City, NY to Los Angeles, CA, Wed, Dec 29 to Sat, Jan 29 - 1 ticket [change cities](#)



Select Departure and Arrival Airports

Please note that Name Your Own Price flights are economy (coach) class only.

Departure Airports

Arrival Airports

▼ CHOOSE THESE AIRPORTS FOR THE BEST DEAL ▼

- | | |
|--|---|
| <input type="checkbox"/> Newark Intl, NJ (EWR) | <input type="checkbox"/> Los Angeles Intl, CA (LAX) |
| <input type="checkbox"/> New York City - John F Kennedy Intl, NY (JFK) | <input type="checkbox"/> Ontario Intl, CA (ONT) |
| <input type="checkbox"/> New York City - La Guardia, NY (LGA) | <input type="checkbox"/> Burbank Glendale Pasadena, CA (BUR) |
| <input type="checkbox"/> Newburgh - Stewart Intl, NY (SWF) | <input type="checkbox"/> Long Beach - Daugherty Field, CA (LGB) |
| <input type="checkbox"/> White Plains - Westchester County, NY (HPN) | <input type="checkbox"/> Santa Ana - John Wayne / Orange County, CA (SNA) |
| <input type="checkbox"/> Islip - Long Island MacArthur, NY (ISP) | |

Name Your Own Price

Name Your Own Price (Per Round-Trip Ticket) \$.00

BEST QUALITY
PRICE & GUARANTEE

Total charges, including taxes and fees, are displayed on the following page.

Passenger and Ticket Information

Your trip will start between 6am and 10pm on your travel dates. Although we always look for non-stop flights first, Priceline flights may make up to one connection each way. Your exact flights and times will be shown to you once your purchase is complete. We will issue convenient electronic tickets.

Please enter passenger name(s) exactly as they appear on a driver's license or other official photo ID. Passengers under the age of 18 must be accompanied by an adult. **Note:** Meal and seat preferences are not guaranteed.

If you already have a priceline profile and would like to access your stored flight preferences, [click here to sign in](#).

Adult Passenger 1: Under 18? ☐

First Name: Middle Name: Last Name: Suffix:

Please provide your TSA Secure Flight information now. [Learn more.](#)

Date of Birth: Gender: ☐ Male ☐ Female

Infants:

Number of unticketed passengers under age 2:

prev

next

Figure 2.11: Opaque Fares Offered by Priceline for Discounted Tickets without Specifying Carrier, Time and the Route [69]

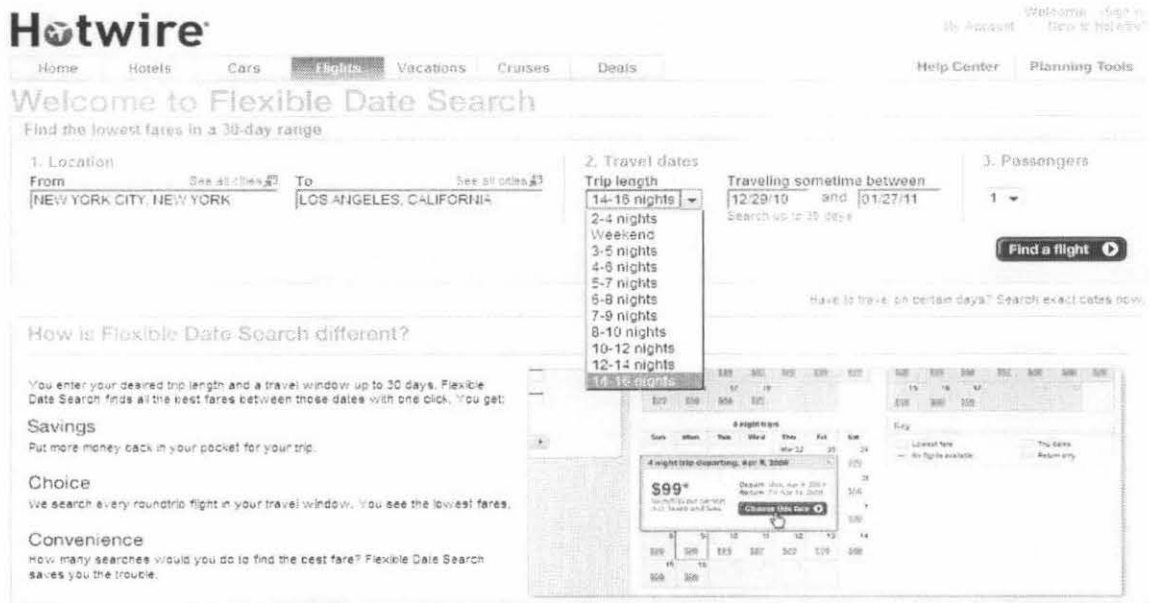


Figure 2.12: Opaque Fares Offered by Hotwire for Discounted Tickets with Specified Time or Flight Number [70]

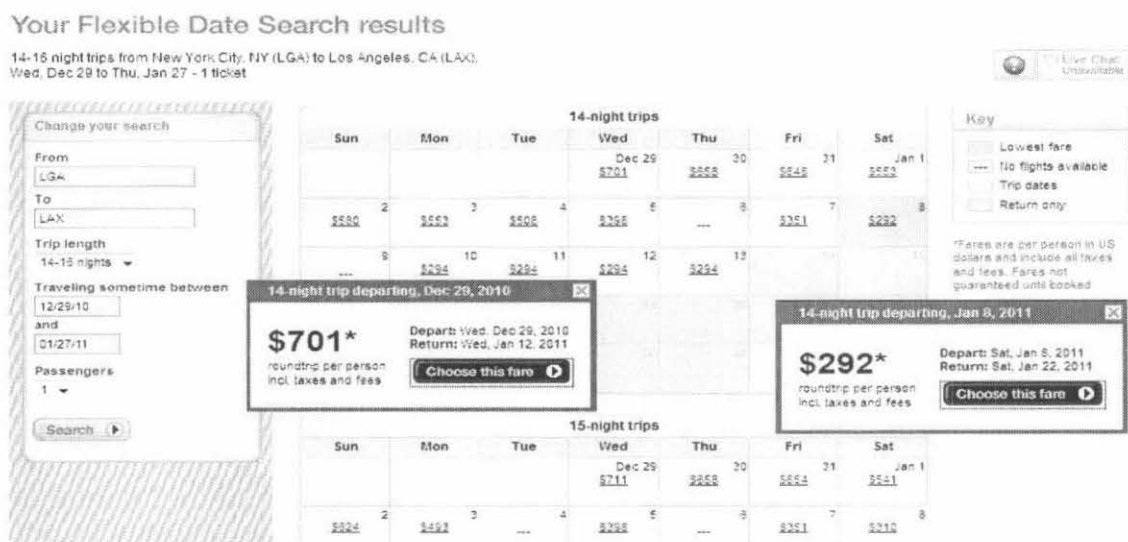


Figure 2.13: Flexible Date Search Results on the of 14-16 Nights' Trip Length [70]

In this section four OTA features have been identified and discussed that are not integrated into SBTs of the airlines mostly because of the practical implication of each OTA feature, which is not very feasible for the SBTs to opt for. However, it is essential in this research to understand if the integration of same OTAs features could make SBTs flexible OARS, and if the answer was yes then how come that could be done. Therefore, preliminary but comprehensive researches need to be conducted with airline executives to examine their subjective satisfaction with existing SBTs by the airlines.

Furthermore, it is also important to explore the recommendations for making SBTs flexible Online Airline Reservation Systems in order to increase the usability of online reservation systems. Further elaboration of the preliminary research can be found in the methodology chapter Section 3.2.3.

2.2 Usability of Online Airline Reservation Systems

Researchers argued that, the design of a website determines online purchase decisions and revisit intentions [71]–[73]. The essence of quality for a successful website has been addressed by many authors time-to-time [74]–[78]. The quality of a website is referred to its usability and functionality [24], [79]. A website will be considered as useable if users can accomplish their tasks easily. Similarly, a website will be considered as functional if it offers all the functions required by a user to perform their tasks [24]. Thus quality of a website can be evaluated on the basis of different functions they offer and the performance of those functions. Therefore, it is very critical for the organizations to design a website that is easy to use and accomplish all the requirements.

In the last twenty years different lines of research have focused on identifying certain factors influencing acceptance of information systems and have provided models and theoretical proposals. Social Cognitive Theory [80], Diffusion of Innovation Theory [81], the Theory of Reasoned Action (TRA) / Theory of Planned Behavior (TPB) [82]–[84], the Triandis Model [85], Human Computer Interaction research [86], the Technology Transition Model [87], and Social Network Theory [88] are representative examples.

In particular, Technology Acceptance Model (TAM), as introduced by Davis [79] where external variables have been identified as factors that tend to influence upon systems perceived ease of use and perceived usefulness. In other words, the model explains how users accept and use technology on the basis of perceived usefulness and perceived ease-of-use of the system influenced by external factors. The contextual interpretation of any event is determined by contextual factors that reinforce viewers' schemas, formulate characteristics of the surrounding environment and ensure

effective collaboration between the two. In case of news processing, for example, the contextual factors that reinforce viewers' schemas are their lifestyle, political socialization, prior knowledge and life experiences, current needs for various types of information, and attitudinal factors such as interest in news and perceived credibility of sources [89]. During the past two decades, TAM is considered the most prominent, powerful and parsimonious theory for describing an individual's acceptance of information systems [90]–[93]. Many other researchers have also contributed to the list of external variables [94]–[96] since original TAM model has more than seven hundred citations to its credit and has been adapted and extended in many ways to-date.

TAM and TPB, have received considerable attention from the scientific community and its use has been extended to the study of tourism services [63]. However, TAM and TPB have successfully explained behavioral intentions, previous research pointed out that TAM and TPB's fundamental constructs do not reflect the specific influences of usage-context factors that may alter users acceptance. Usage-context factors are based on users' contextual interpretations that are based on their attitude or belief. In case of Online Airline Reservation Systems, it is suggested that TAM and TPB should be considered with more belief-related variables. Therefore, in our framework, self-determined psychological factors that may influence upon perceived flexible personality of travelers by way of reinforcing their purchase decisions are adapted from the TAM.

2.2.1 Usability Perception

Customers' acceptance of the internet, as a suitable medium for booking their itineraries, has been accelerated due to the structural changes in the aviation industry [97]. Likewise, research shows users dissatisfaction with existing Online Airline Reservation Systems in terms of task completion [26]. Therefore, researchers are eager to find out ways for improving online usability of the systems, how users' Perceived Usability of the system is formulated by its flexibility functions [27]–[31]. In addition to techniques, methods and guidelines proposed for designing usable systems, HCI researchers have also long argued on the importance of human factors

in designing and implementation of user-centered designs. According to Nielson [32], “users experience usability of a site before they have committed to using it and before they have spent any money on potential purchases”. This indicates users’ Perceived Usability in online digital environments is an important determinant for evaluating their satisfaction in the same environment. The existing literature can be divided into four research aspects where researchers currently are focusing upon to determine Perceived Usability of online systems.

2.2.1.1 Usability Perception by Performing Content Analysis

Many worldwide researchers in tourism industry have examined Perceived Usability by performing content analysis of websites’ features [98]–[103] which involves technical assessment of the basic content and hypertext structure of the websites. For example, Morrison *et al.* [104] provided a comprehensive study of different websites evaluation approaches by categorizing them into four groups. The grouping was based upon determining “effectiveness and efficiency” and “Why and When” in evaluation of the websites. Similarly, Law and Leung [101] examined 30 different North American Online Airline Reservation Systems for evaluating the range of comprehensive online reservation services provided by each of them. Their research provides useful sets of attributes for consideration. Their findings which were based on those useful sets of attributes showed significant differences user’s satisfaction with each website. Furthermore, Scharl *et al.* [105] changed the traditional evaluation techniques done by human experts and introduced an automated tool for the systematically evaluation of websites.

2.2.1.2 Usability Perception through User’s Internet Adoption

The second area of research is based upon examining Perceived Usability of online system through user’s internet adoption practices [97]. One major pitfall of this kind of research is that it primarily focuses upon use of internet technologies instead of evaluating websites for determining Usability Perception of users. The investigation

methodologies typically involve interviews or surveys of tour operators, hotels and destination marketing organizations [106], [107].

2.2.1.3 Usability Perception based on Users' Preferences and Expectations

The third area of research is based upon investigating web users' characteristics, preferences, and expectations [108] from online systems, and to compare with the Perceived Usability of the systems. For example, researchers have investigated the demographic differences between the "lookers" and "bookers" [109], [110] in online reservation systems and how their Perceived Usability different from one another due to the contextual factors involved. Then there are a few academic studies where researchers have investigated customer preferences and expectations for tourism websites [97]. However, no study has been undertaken to examine customer preferences and expectations from online airline reservation websites [97].

2.2.1.4 Usability Perception based on Online Behavior of Web Users

The fourth most important and sophisticated area of research is the investigation of online behavior of web users [97] and how their behavior is related to determining perceived usefulness of the system. Some researchers have paid attention to online users' search behavior on information [111], [112]. Bai *et al.* [113] studied online travel behavior of US college students. Rudstorm and Fagerberg [114] adopted quasi-experimental methodology to investigate customer's behavior and to explore emerging concept of socially enhanced travel booking. In addition to this, Klein *et al.* [115] and Marcussen [116] have examined online behavior of European travelers that have possibly led to slower adoption trend of online air travel bookings in Europe. Their findings showed that lack of relevant information, price dispersion, product complexity, and the usability of online booking tools were the rationale behind customers' such behavior.

2.2.2 Conceptual Linking between PU and FTB and FOARS

To discover the relationship between Perceived Usability (PU), Flexible Traveling Behavior (FTB) and flexible Online Airline Reservation Systems (FOARS), it is necessary to study usability in the context of flexibility from two different perspectives, i.e. from user's traveling behavior and flexibility of the reservation systems.

Users traveling behavior is molded by a number of important personality relevant determinants, both internal and external in characteristics. While, traveling consciousness, self-efficacy in digital skills and self-belief as flexible travelers are internal personality relevant determinants influencing directly upon travelers flexible behavior, societal influences, attribution and prior experiences are external personality relevant determinants that indirectly influence upon travelers flexible behavior. Moreover, external determinant may not necessarily always have the same influence every time, depending upon the situation the traveler is in.

As for System's Flexibility is concerned, system's perceived flexibility is reflected in its Perceived Usability. Perceived Usability is a combination of system's effectiveness, efficiency and satisfaction. End user support or user prompting is considered to be a supporting characteristic that substantially augments efficiency and effectiveness of the system, while multiple options directly influence upon user satisfaction. If a system provides ranges of dates as flying and source destination options at different fares, flexibility of the system is enhanced in its Perceived Usability in the eyes of the users. This is because if a user chooses a flying option 'A' from a given one or two options, he has not made a flexible decision. But if he chooses the same flying option 'A' from a variety of given flying options, he is likely to enjoy extra satisfaction that he will get from the flexibility of the system and also in his purchase making decision. Likewise, if a system offers multiple flying options, they will also influence upon users' decision and make them change their mind to opt to fly from option 'B' instead of 'A'. This will again have positive influence upon user's satisfaction from the system – Perceived Usability. More details on this study can be found in chapter 3 Section 3.3.1.

2.3 Usability Vs. Flexibility

Researchers point out [117] that opaque products are flexible in characteristics; therefore, a seller is in a unique position to offer horizontally differentiated products to customers upon purchase due to the flexibility of assigning pre-determined products to the customer. Opaque selling became popular since they offered a very unique price discrimination mechanism [118] and could generate incremental revenue for the airline by deliberating upon price sensitive consumers [119]. In very short time, opaque selling has attained the status of a competitive lever for the airline, signifying that an airline could suffer revenue loss to its competitors by not opting to offer opaque offers [120].

The concept of online airlines reservation systems or SBTs for disposing off their opaque inventory directly has not been adequately considered in information system research and literature. As highlighted by Jerath *et al.* [10] a number of studies have carried out with primary focus upon airline revenue management systems, however attempts to empirically verify those findings are a few. However, some recent research by Jiang [118], Fay [121], Granados et al [122], Jerath *et al.* [10] have made strong argument in favour of this connotation and given theoretical justifications in support of the argument. Likewise, recent research on opaque selling has rather adopted an objective discourse to empirically validate revenue management theories (see, for example, Puller *et al.* [123]). Granados *et al.* [122], [124] has compared price elasticities of the offline, online transparent and opaque channels. Their findings suggest that opaque selling mechanism has high price elasticity. Again this does not adequately address the research gap on opaque selling through SBTs.

It is believed offering opaque selling through SBTs will not reduce profits, as in the case of direct last-minute selling undertaken by an airline, because it holds a critical position to replicate its profit margin by setting high price of opaque selling. But on a more fare note, airlines may like to introduce opaque selling directly through their SBTs so as to attract additional sufficient number of customers and minimize the effect of price degradation, as discussed earlier. Thus it is believed that if an airline opts for opaque selling through its SBTs, it can enhance its profit through market expansion and also by enhancing price discrimination of one's existing customer base

[121]. Moreover, in order to test applicability of opaque selling, empirical research on opaque selling intermediaries show that it depends upon certain factors, e.g. demand characteristics (Jerath *et al.* [10], Fay and Xie [18], Granados *et al.* [122]), product characteristics [118], consumer loyalty [121], industry structure [120] and competition [10], [125]. However, this research adopts an approach based on behavioral characteristics. This is because literature review has highlighted that direct last-minute selling, although could lead to severe consequences for the airline, is still preferred over opaque selling through an opaque intermediary because of high expectations of customers on little service differentiation [10]. And research on opaque selling shows it has been preferred over direct last minute selling with an increase in high demand situations and this has been the primary factor for airlines to opt for opaque selling intermediaries [10]. However, if an airline opts for an opaque fare selling it can position itself more competitively than opaque selling intermediaries because of its knowledge and accurate resource information and management [10]. Thus if an airline opts to adopt an opaque selling mechanism, it will be in a win-win situation, whereby it will employ its own resources and provide opaque selling directly to price-sensitive customers, who do not wish to anticipate hidden characteristics of the service to be provided to them, a major concern in opaque selling through intermediaries. Not only this, it will also add brand customer loyalty to its credit as well.

The proposed model in this thesis thus integrates opaque selling mechanics into the framework for designing of flexible Online Airline Reservation Systems. Thus, it is important to discuss mechanics of opaque selling from same two perspectives discussed earlier, System's Flexibility and User's Flexibility.

2.3.1 Opaque Selling Mechanics in System's Flexibility

In order to determine the role of opaque fare in making airlines SBTs (system) flexible and improve their usability it is first and foremost important to discuss flexibility of SBTs.

Earlier B2C systems were considered to be not very flexible as mentioned by Olsen & Malizia [20], [21] in terms of handling more open requests that could not be possibly mapped directly into the formalized terms offered by the Web-interface. They would work for simple closed requests, i.e., a request that could be mapped directly into formalized terms or pre-defined parameters such as dates, airports, flights, etc. The system could break down for more complex closed requests, i.e., where the customer is flexible with regards to attributes such as destination and dates [20], [21]. Olsen & Malizia has recommended an information system, as an intermediate between a customer and booking system, that would provide the user with all the necessary data and support, on a mere button-click, after the initial data has been fed into the system, see Figure 2.14.

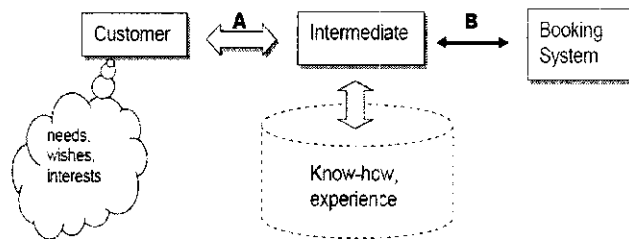


Figure 2.14: Ticket Reservation through Intermediate

Source: Flexible User Interfaces for B2C Systems [20]

As per the above diagram, the role of intermediate system which is an SBT in this case is to provide detail information to users, which could be useful in making good decisions [20], [21]. Therefore, SBTs being intermediate information systems serve the purpose of human agents in order to map formalized terms into closed requests. And the existing SBTs cover mostly pre-sales flexibility [126]. The term “flexibility” here should not only be related with the booking of a ticket in case of online booking system. If we say, our booking/reservation system is flexible then ideally speaking, it should also support flexibility with regards to flexible features of the system. Since the essence of a successful quality website has been addressed by many authors from time-to-time [74]–[78] and the quality of a website is referred to its usability and functionality [24], [76]. Likewise, in case of usability of SBTs, users have reported to be unsatisfied when they are flexible with regards to traveling attributes such as destination and dates [20], [21], [26] and systems are not. That is why many researchers are trying to find out ways so as to improve online usability [26]–[30] and

HCI researchers have long argued on the importance and criticality of human factors' study to the successful design and implementation of technological devices so as to improve system's usability by enhancing its flexibility.

In context of integrating opaque mechanics into existing SBTs of airlines, we know from literature that when comparing last-minute direct sales of an airline, with those offered through an opaque selling intermediary, researchers have found out that opaque channel increases total demand [17] since customers are contended to comprise on hidden attributes in anticipation of heavy discounts. This anticipation of travelers for low fares is an extremely important concern, that airlines are faced with every day. As mentioned earlier, airlines are not in a strategic position to offer low cost fares directly to dispose-off their distressed inventories, mainly due to potential threat to their revenue generation, therefore, the only business model that successfully addresses this concern is opaque selling through intermediaries or OTAs. However by opting for OTAs, such as Priceline for example, the traveling attributes such as the airline or the route to be flown are hidden and research shows frustration experienced by travelers when they end up flying a much more circuitous route, than they might have wished and also not necessarily with the most preferred carrier. Moreover, even if an airline sells its distressed inventory through opaque selling intermediaries, it does not add brand loyalty of travelers to its credit, as travelers are likely to remain impartial to the carrier they fly with under opaque selling [79]. Likewise, research shows that more airline products become opaque or hidden in nature, higher the dissatisfaction of the traveler becomes with the quality of airline solution or service [79]. Therefore, it is argued that opaque selling mechanics if adopted by existing SBTs, they will not only become flexible reservation systems and could even bring similar or higher incremental revenue for the airline.

2.3.2 Opaque Selling Mechanics in User's Flexibility

Anticipation of travelers for low fares not only indicates why opaque selling intermediaries became so popularly accepted, but also an idea about traveling behavior of customers, which is '*the extent to which a traveler anticipates for a low fare*', indicating the extent to which '*a traveler is ready to compromise on flying*

conditions', and thus becoming flexible in accepting what is being offered to them by an airline. The idea of flexibility is not something new in airline industry, it was proposed by Schwieterman [127] who had emphasized upon segmentation of the market between discretionary and non-discretionary travelers using time flexibility. More, recent research by Garrow [128], and Carroll *et al.* [129] also deploy time flexibility as a value driver. However, there appears to be no research done to date, in which destination flexibility is used as a value driver [79]. By designing SBTs in view of User's Flexibility, they will be provided additional detailed information and choices unquestionably useful in making good decision [20], [21].

2.4 Chapter Summary

As said earlier, this research is undertaken to examine applicability of opaque selling mechanics on SBTs and have discussed the same in context of System's Flexibility and User's Flexibility to increase the Perceived Usability of Online Airline Reservation Systems. The first two research areas of Usability Perception i.e. Usability Perception by Performing Content Analysis and Usability Perception through User's Internet Adoption are related to supply oriented studies, the other two studies i.e. Usability Perception based on Users' Preferences and Expectations and Usability Perception based on Online Behavior of Web Users are demand driven since they consider online services and features used by travelers when making traveling and purchasing decisions. There are also some researchers who have combined some or all four research areas for investigating Usability Perception of online systems. For example, Benckendorff and Black [99] have used surveys of regional tourism organizations as well as website evaluations methods. Nysveen [108] conducted surveys and obtained results from both web users and tourism businesses. Their research objective was to investigate gaps between customer preferences and actual website offerings.

This research uses a blended approached and combines the four research areas of Usability Perception to determine Perceived Usability of the Online Airline Reservation Systems. It is important because customers' usability expectation and preferences from Online Airline Reservation Systems lacks research and empirical

findings. Law and Leung [101] had emphasized upon the need to investigate expectations of airline customers that book their itineraries through their online self-booking tools. Moreover, the existing evaluation of online tourism websites is performed by researchers and not by customers. It leads to a dilemma and research gap that does not potentially address expectations of travelers. Even though internet is referred as a major technological innovation of today, its success heavily depends upon assimilation of customer expectations and preferences into the design and content of websites [101]. For airlines to run successful business, in spite of their products are sold online or through more traditional channels, it is important to design their self-booking tools in view of customers' preferences, expectations and online usage behavior.

Thus, behavioral characteristics in terms of making travelers flexible are appealing and an important area of research. And if it can be determined, i.e., what makes a traveler flexible on the basis of his/her behavioral characteristics, it could give crucial insight for designing of Flexible Online Airline Reservation Systems, based on SBTs offering opaque selling. The existing opaque selling literature lies at the intersection of consumer behavior and revenue management operational strategies [40]. However no study has been found to address consumer behavior on opaque selling with respect to online airline reservation system as most recent paper and researchers are done within the marketing domain [40]. The research therefore examines travelers' expectations, preferences and online behavior (User's Flexibility) and aligns that with designing of flexible Online Airline Reservation Systems (Systems Flexibility) and users' as evaluators of the online systems to determine its usefulness through effectiveness, efficiency and satisfaction (Perceived Usability).

This anticipation of travelers for low fares is an extremely important concern, that airlines are faced with every day. As mentioned earlier, airlines are not in a strategic position to offer low cost fares directly to sell their left over inventories, due a number of potential threats to their revenue generation, therefore, the only business model that addresses this concern is opaque selling by OTAs. The concept of online airlines reservation systems or SBTs for disposing off their opaque inventory directly has not been adequately considered in information system research and literature. The concept requires extensive research especially in academic discipline [40] and as

highlighted by Jerath *et al.* [10] a number of studies have focused upon airline revenue management systems, however attempts to empirically verify those findings are a few. Likewise, recent research adopts an objective discourse to empirically validate revenue management theories (see, for example, Puller *et al.* [123]). This does not adequately address the research gap on opaque selling. Moreover, the only known studies on opaque selling are of Granados *et al.* [122], [124] who have compared price elasticities of the offline, online transparent and opaque channels. Their findings suggest that opaque selling mechanism has high price elasticity.

Literature also highlights that direct last-minute selling, although could lead to severe consequences for the airline, it is still preferred over selling through an opaque intermediary in case of high expectations of customers and customer expecting little service differentiation [10]. However, research on opaque selling also shows it has been preferred over direct last minute selling with an increase in high demand situations and this has been the primary factor for airlines to opt for opaque fare intermediaries [10]. However, if an airline opts for an opaque fare selling it can position itself more competitively than opaque selling intermediaries because of its knowledge and precise information on availability of its own resources [10]. This could put an airline in a win-win situation, whereby it will employ its own resources and provide opaque selling directly to price-sensitive customers, who do not wish to anticipate hidden characteristics of the service to be provided to them, a major concern in opaque selling through intermediaries.

Anticipation of travelers for low fares, gives an idea about their traveling behavior, which is '*the extent to which a traveler anticipates for a low fare*', indicating the extent to which '*a traveler is ready to compromise on flying conditions*', and thus becoming flexible in accepting what is being offered to them by an airline. The existing opaque selling literature lies at the intersection of consumer behavior and revenue management operational strategies [40]. However no study has been found to address consumer behavior on opaque selling with respect to online airline reservation system as most recent paper and researchers are done within the marketing domain [40]. This research therefore contributes to the small but growing literature in designing of Online Airline Reservation Systems by moulding upon flexible behavior of travelers.

CHAPTER 3

METHODOLOGY

3.0 Chapter Overview

In this chapter, the overall methodology of the thesis is described which is divided into three phases. Each phase contains one core research objective which is achieved through the corresponding research questions and hypotheses. Section 3.1 is devoted to the organization of the phases named as research methodology. Section 3.2 covers Phase I that consists of 3 studies to investigate and discuss the user needs associated to System's Flexibility and Users' Flexibility. Section 3.3 is dedicated to Phase II which contains 2 further studies to classify users and to investigate the interrelationship of the variables. At the end of Phase II, an overview of the study results are also presented in order to facilitate the description of the methods used in this research work. Section 3.4 presents Phase III which contains a case study in order to test the proposed framework. Section 3.5 presents the statistical formulas that are used in this research and Section 3.6 summarizes the chapter.

3.1 Research Methodology

The methodology of this thesis consists of three phases which are described below. The overall research methodology and a complete list of research questions and the corresponding hypothesis are shown in Figure 3.1 and Table 3.1 respectively.

- Phase I: Assessing User Needs (System's Flexibility & Users' Flexibility)
- Phase II: User's Classifications (Interrelationship Testing of Variables)
- Phase III: Case Study (Testing the Model)

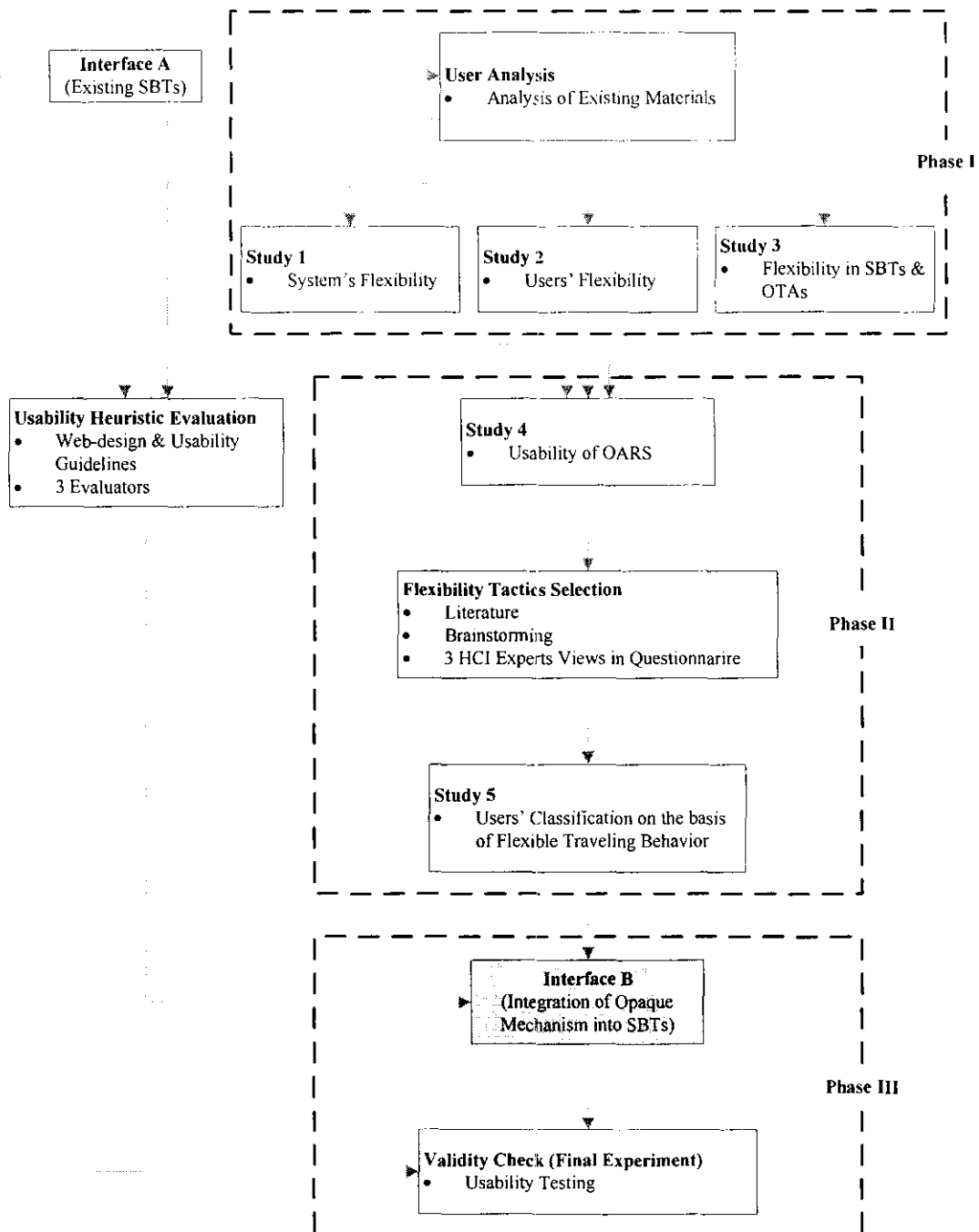


Figure 3.1: Research Methodology

Table 3.1: Research Questions and Hypotheses

| Phase | Study | Research Objectives | Research Questions | Hypotheses | Analysis |
|-------|-------|--|--|---|---|
| I | 1 | To assess user needs (System's Flexibility and Users' Flexibility) associated with Online Airline Reservation Systems. | RQ1: What are the issues with flexibility of Online Airline Reservation Systems, whether or not flexibility is one of the reasons for users not using such systems? | H₁: Non-functional Requirements are perceived to have an impact on the usability of OARS. | Correlation Analysis, Reliability Analysis, Descriptive Analysis. |
| | | | | H₂: Functional Requirements are perceived to have an impact on the usability of OARS. | |
| | | | | H₃: The perceived flexibility of OARS affects the usability of such systems. | |
| | | | | H₄: Functional Requirements of OARS are inversely associated with the flexibility of the systems. | |
| | | | | H₅: The availability of resources and skills set influence upon the usability of OARS. | |
| | 2 | | RQ2: To what extent flexible users can compromise with service quality attributes of Online Airline Reservation Systems? | H₆: The level of satisfaction with existing SBTs is different for respondents with different attitudes towards Users' Flexibility in compromising on SQAs of the airline. | ANOVA & Post-Hoc |
| | | | | H₇: The level of satisfaction with existing OTAs is different for respondents with different attitudes towards Users' Flexibility in compromising on SQAs of the airline. | |

Table 3.1: Research Questions and Hypotheses (continues)

| Phase | Study | Research Objectives | Research Questions | Hypotheses | Analysis |
|-------|-------|--|--|--|--|
| | 3 | | RQ3: How users' satisfaction with an existing SBTs is rated against their choice of OTA feature and reflected in their integration assessment of the same for making SBTs more flexible Online Airline Reservation Systems? | H₈: Users' satisfaction with existing SBTs is different across their choice of four OTA features for making SBTs more FOARS. | Two-Way ANOVA |
| II | 4 | To propose a framework for designing more flexible Online | RQ4: How users' perception on factors influencing flexible traveling behavior and flexible OARS is determined? | — | Emerging Theme Analysis |
| | 5 | Airline Reservation Systems while classifying users on the basis of their Flexible Traveling Behavior. | RQ5: How to classify Users' on the basis of their Flexible Traveling Behavior into High, Medium and Low flexible and how to investigate interrelationships among System's Flexibility, Users' Flexibility and Perceived Usability of existing Online Airline Reservation Systems? | H₉: Users can be classified on the basis of their Flexible Traveling Behavior. H₁₀: User's Flexible Behavior and their Perceived Usability is correlated. H₁₁: User's Flexible Behavior and System's Flexibility is correlated. H₁₂: Perceived Usability of OARS is not affected by users' Flexible Traveling Behavior after adjusting for the effect of the covariate, System's Flexibility. | Unidirectional Scale Correlation Analysis Correlation Analysis ANCOVA |

Table 3.1: Research Questions and Hypotheses (continues)

| Phase | Study | Research Objectives | Research Questions | Hypotheses | Analysis |
|-------|------------|--|--|---|------------------------------|
| III | Case Study | To study the interrelationship between System's Flexibility, Users' Flexibility and Perceived Usability of Online Airline Reservation Systems and to determine the Perceived Usability of the existing and proposed systems. | RQ6: How do service quality attributes of airlines and external variables jointly predict flexible behavior of travelers? | H₁₃: Flexible behavior of travelers cannot be predicted by service quality attributes and external variables. | Multiple Regression Analysis |
| | | | RQ7: How does user Perceived Usability with the existing and the proposed system differs? | H₁₄: User Perceived Usability with existing and proposed systems is different across the three groups. | Two-Way ANOVA |
| | | | RQ8: Is there a multivariate main effect of user's Flexible Traveling Behavior (High, Medium and Low) on effectiveness, efficiency and satisfaction of the proposed system? | H₁₅: There are differences among effectiveness, efficiency and satisfaction caused by the users' Flexible Traveling Behavior. | MANOVA |
| | | | | H₁₆: Effectiveness, efficiency and satisfaction in the proposed FOARS is highest for users with highest flexible behavior. | Post-Hoc |

3.1.1 Phase I: Assessing User Needs (System's Flexibility & Users' Flexibility)

In Chapter 2, two different perspectives of flexibility, i.e. (1) System's Flexibility (Computer) and (2) Users' Flexibility (Humans) were discussed. Therefore, in Phase I, existing Online Airline Reservation Systems (Interface A) were used to assess the System's Flexibility and Users' Flexibility. Three studies were conducted in this phase as follow:

1. A study to investigate issues with flexibility and if flexibility is the reason for not using Online Airline Reservation Systems.
2. A study to investigate users' flexible behavior in terms of compromising on service quality attributes of an airline.
3. A study to examine if integration of OTAs features can make SBTs more flexible in the context of Online Airline Reservation Systems?

Section 3.2 will discuss Phase I in detail.

3.1.2 Phase II: User's Classification (Interrelationship Testing of Variables)

Phase II was designed to carry out extensive relationship testing of variables and their sub-measuring constructs towards developing a framework for designing a more Flexible Online Airline Reservation System. Two detailed studies were conducted in this phase with the following research objectives:

1. To explore the concept of users' perception on factors influencing Flexible Traveling Behavior and Flexible Online Airline Reservation Systems.
2. To classify Users' on the basis of their Flexible Traveling Behavior (Low, Medium, High) and to investigate interrelationships among System's Flexibility, Users' Flexibility and Perceived Usability of existing Online Airline Reservation Systems.

Section 3.3 will discuss Phase II in detail.

3.1.3 Phase III: Case Study (Testing the Proposed Framework)

Phase III is related to the design of a case study (paper prototype) and the corresponding analysis to answer the final research questions. Participants were requested to complete the usability evaluation of the existing and proposed interfaces (Interface B). Quantitative technique was used to analyze the data collected in the context of System's Flexibility, Users' Flexibility and Perceived Usability of the systems. Section 3.4 will discuss Phase III in detail. The following research questions were addressed:

1. How do service quality attributes of airlines and external variables jointly predict the flexible behavior of travelers?
2. How does user Perceived Usability with existing and proposed systems differs?
3. Is there a multivariate main effect of user's Flexible Traveling Behavior (High, Medium and Low) on effectiveness, efficiency and satisfaction of the proposed system?

3.2 Phase I: System's Flexibility and Users' Flexibility

Three studies were conducted in this phase as shown below using the existing OARS to assess the System's Flexibility and Users' Flexibility.

3.2.1 Study 1: Issues with Flexibility

This study is to address the 1st research question.

RQ1: What are the issues with flexibility of Online Airline Reservation Systems, whether or not flexibility is one of the reasons for users not using such systems?

3.2.1.1 Rationale

The rationale behind pilot study 1 was to assess users' needs from the System's Flexibility perspective. The primary objective of Requirements Engineering (RE) is to build a foundation of a product that satisfies the customers' needs and interests. In addition to pure functionality, customers want to see non-functional characteristics in the systems, such as security, stability, usability and high performance. Such Non-Functional Requirements (NFRs) have become essential for the success [130] of today's businesses.

The role of NFRs for the success or failure of any Transaction Processing System is as important as in any other systems. In the case of electronic commerce, security and privacy of consumers' sensitive personal data are one of the major concerns [131]. Consumers' lack of full adoption of electronic commerce solutions is not merely due to the concern on security and privacy, but also caused by a variety of non-functional characteristics such as flexibility, consistency, learnability, and reliability. This study specifically addresses the notion of flexibility of such systems, trying to establish how much the success of Business to Consumer (B2C) e-commerce hinges on them.

The main objective of pilot study 1 in phase 1 was to investigate customers' concerns for not using Online Airline Reservation Systems, and to study the relationship between flexibility and the use of Online Airline Reservation Systems. Therefore, this study focuses on the following sub research questions:

- What are the reasons for not using Online Airline Reservation Systems?
- Do customers have concerns with the flexibility of current Online Airline Reservation Systems?
- Does the perceived flexibility of Online Airline Reservation Systems significantly affect the usability of such systems?

3.2.1.2 Methodology

In this phase, the methodology of the study followed quantitative research based on the self-reporting questionnaire and testing of hypothesis as shown in Figure 3.2. The hypotheses were:

H₁: Non-functional Requirements (NFRs) are perceived to have an impact on the usability of OARS.

H₂: Functional Requirements (FRs) are perceived to have an impact on the usability of OARS.

H₃: The perceived flexibility of OARS affects the usability of such systems.

H₄: Functional Requirements of OARS are inversely associated with the flexibility of the systems.

H₅: The availability of resources and skills set influence upon the usability of OARS.

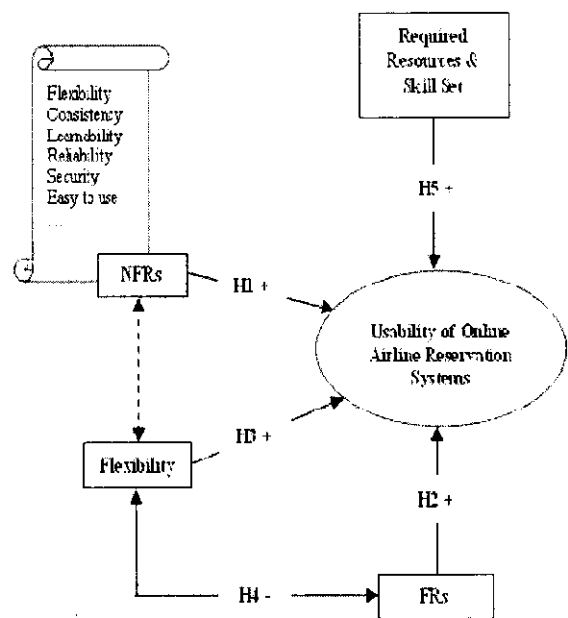


Figure 3.2: Research Model for the Hypothesis to be Tested

3.2.1.3 Validity

A questionnaire was designed in order to test the model and the above hypotheses (Appendix A). A mixture of two approaches—adaptive (questions from existing literature) and development (questions as per the required scenario) – was used to prepare the questionnaire. Relevant and useful questions were adapted from the literature review [132]–[134].

In order to ensure that items on the questionnaire were related to the constructs being measured, the Content Validity Index (CVI) was used. According to Burns and Grove [135] Content Validity is obtained from three sources: literature, representatives of the relevant populations, and experts. The Content Validity Index (CVI) developed by Waltz and Bausell [136] was used in this study.

Three human factor students with expertise in usability were asked to rate each item on the questionnaire based on Relevance, Clarity, Simplicity and Ambiguity on the four-point scale. The results of CVI were analyzed and items that had CVI over 0.75 remained and the rest were discarded. The remaining items were modified, based on the experts' opinions.

The questionnaire consists of 13 questions on Non-functional Requirements - NFR (excluding flexibility), 9 questions on Functional Requirements - FR, 11 questions exclusively on Flexibility, and 3 questions on assessing Users' resources & skills when booking or using Online Airline Reservation Systems.

The pilot testing of the questionnaire was also conducted through a series of informal interviews with PhD and Master level students at Universiti Teknologi PETRONAS before sending the questionnaire to the target audience.

3.2.1.4 Sample Size

To analyze the model under consideration and to study the factors that impact the use of online reservation systems, more than 200 copies of the questionnaire were emailed or hand-distributed to various students and faculty members of two Universities

namely, Universiti Teknologi PETRONAS (UTP) and Universiti Teknologi Mara (UiTM). The analysis of the participants is shown in Figure 3.3.

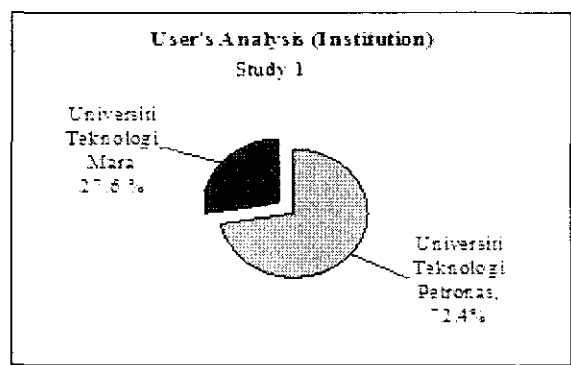


Figure 3.3: User’s Analysis of Participants from UTP

3.2.1.5 Response Rate

140 responses were received, yielding a response rate of 70% of the total population surveyed. Out of 140, 78 respondents reported to be inexperienced with online ticket buying; the remaining 62 respondents considered themselves experienced.

3.2.1.6 Scale

Each construct included questions presented in a five-point Likert mode, ranging from “strongly agree” to “strongly disagree.” Respondents’ responses were scored as: for the “strongly agree” response was assigned a score of 5, while for the “strongly disagree” response was assigned a score of 1. Consequently, users’ gaining higher scores in a certain scale showed stronger preferences toward the specific scale.

3.2.1.7 Analysis

In order to test influence of variables on another, 5 research hypotheses were designed in this study that was correlated using Pearson Correlation Coefficients. Pearson Correlation (Section 3.5.2) is regarded as the most familiar measure of examining dependence between two quantities. It indicates the strength of a linear relationship

between two variables; however its value generally does not completely characterize their relationship [137]. Additional analyses were performed on data, by computing descriptive analysis (Section 3.5.1) and Reliability Analysis (Section 3.5.3). Data analysis carried out will be discussed in Chapter 4.

3.2.2 Study 2: Users' Flexible Behavior in Terms of Compromising on SQAs

This study is to address the 2nd research question.

RQ2: How flexible users are in term of compromising on Service Quality Attributes (SQAs) of Online Airline Reservation Systems?

3.2.2.1 Rationale

The rationale behind study 2 was to assess users' needs from the Users' Flexibility perspective. A mixture of two approaches – adaptive (questions from existing literature) and development (questions as per the required scenario) – was used to prepare the questionnaire (Appendix B). Relevant and useful questions were adapted from the literature review [134], [138], [139].

3.2.2.2 Methodology

Study 2 followed a quantitative research methodology based on self-reporting questionnaire and testing of hypothesis. The null and alternate hypotheses for the study are given below:

H₆: The level of satisfaction with existing SBTs is different for respondents with different attitudes towards Users' Flexibility in compromising on service quality attributes of the airline.

H₀: The level of satisfaction with existing SBTs is same for respondents with different attitudes towards Users' Flexibility in compromising on service quality attributes of the airline.

H₇: The level of satisfaction with existing OTAs is different for respondents with different attitudes towards Users' Flexibility in compromising on service quality attributes of the airline.

H₀: The level of satisfaction with existing OTAs is same for respondents with different attitudes towards Users' Flexibility in compromising on service quality attributes of the airline.

3.2.2.3 Validity

For the second pilot study, after ensuring Content Validity using Waltz and Bausell [136] scale, Criterion Validity was computed through Concurrent validity to ensure whether the questionnaire is truly measuring users' satisfaction with existing SBTs and OTAs.

In psychometrics, Criterion Validity is a measure of how well one variable or set of variables predicts an outcome based on information from other variables, and will be achieved if a set of measures from a personality test relate to a behavioral criterion on which psychologists agree [140]. Criterion Validity was ensured through implementing concurrent validity of the measuring constructs, i.e. Users' Flexibility in terms of compromising on service quality attributes of airlines (Users' Flexibility) and effectiveness, efficiency & satisfaction (Perceived Usability), by taking feedback of 12 randomly selected users. Concurrent validity is particularly useful to demonstrate where a test correlated with a measure has previously been validated [141]. In this case, Pilot study 1 had already established a strong correlation of Users' Flexibility with Perceived Usability of Online Airline Reservation Systems (H₅).

Validity check results showed a strong positive correlation of $r = 0.354$, $p < 0.05$ between Users' Flexibility in terms of compromising on service quality attributes of

airlines and Satisfaction. Essentially, this means Users' Flexibility in terms of compromising on service quality attributes of airlines can be used to predict their satisfaction from existing online reservation systems, both SBTs and OTAs.

3.2.2.4 Sample Size

250 copies of the questionnaire were hand-distributed to various students at Universiti Teknologi PETRONAS and four travel agencies in Malaysia located in the city of Ipoh, Perak. The analysis of the participants from travel agencies and those respondents from Universiti Teknologi PETRONAS are shown in Figure 3.4 and Figure 3.5 respectively.

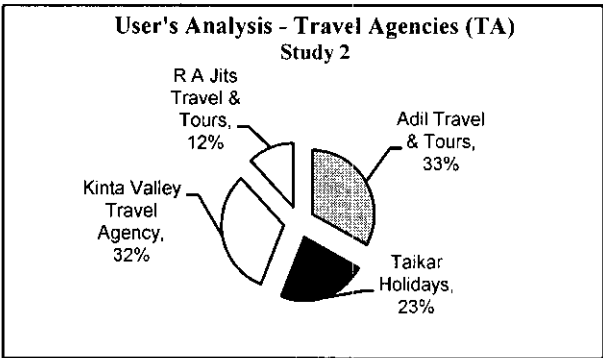


Figure 3.4: User’s Analysis of Participants from Travel Agencies

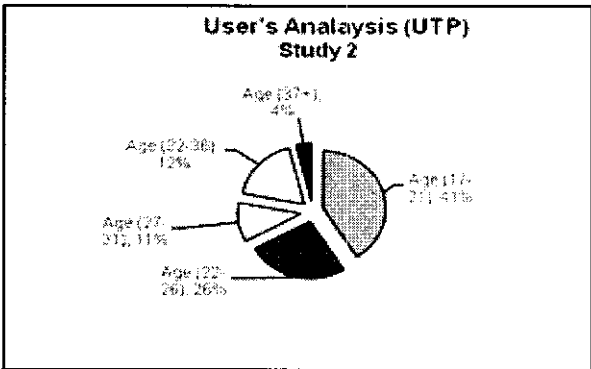


Figure 3.5: User’s Analysis of Participants from UTP for Study 2

3.2.2.5 Response Rate

169 responses were received, yielding a response rate of 67.60% of the total population surveyed. Out of 169, 106 (63%) respondents were from Universiti Teknologi PETRONAS, while the remaining 62 (37%) respondents were travelers visiting traveling agencies.

3.2.2.6 Scale

Each construct included questions presented in a five-point Likert mode, ranging from “strongly agree” to “strongly disagree.” Respondents’ responses were scored as: for the “strongly agree” response was assigned a score of 5, while for the “strongly disagree” response was assigned a score of 1. Consequently, users’ gaining higher scores in a certain scale showed stronger preferences toward the specific scale.

3.2.2.7 Analysis

In order to test the stated alternate and null hypothesis H_6 and H_7 in this study, One-way Analysis of Variance (ANOVA) was computed to determine the satisfaction mean of users with existing SBTs and OTAs. ANOVA (see Section 3.5.4) is a statistical method used to compare the means of two or more groups.

ANOVA for H_6 was computed to determine satisfaction mean of users with existing self-booking tools of the airline, who at the same time reported their flexibility level in terms of compromising on service quality attributes of the airline. The respondents had to select from the three given options of, (1) Can compromise on service quality attributes, (2) May compromise on service quality attributes, (3) Cannot compromise on service quality attributes. This was followed by ANOVA for H_7 to determine satisfaction mean of users with existing online travel agencies of the airline, who at the same time reported their flexibility level in terms of compromising on service quality attributes of the airline. The respondents had to select from the three given options of, (1) Can compromise on service quality attributes, (2) May

compromise on service quality attributes, (3) Cannot compromise on service quality attributes. Data analysis carried out will be discussed in Chapter 4.

3.2.3 Study 3: Integration of OTAs Features can make SBTs more FOARSs

This study is to address the 3rd research question.

RQ3: How users' satisfaction with an existing SBTs is rated against their choice of OTA feature and reflected in their integration assessment of the same for making SBTs more flexible Online Airline Reservation Systems?

3.2.3.1 Rationale

The rationale behind study 3 was to investigate if the integration of some OTA features could make SBTs a more Flexible Online Airline Reservation Systems and how that can be achieved? Therefore, a preliminary but comprehensive focus group research was conducted with airline executives, using quantitative survey method to:

- examine their subjective satisfaction with existing self-booking tools provided by the airlines,
- report if the group approve or disapprove the proposed idea of the four OTA features (Matrix Display, Opaque Fare, Alternate Airport Search, Hotel Search Facility) integrated into SBTs so as to make them Flexible Online Airline Reservation Systems, and
- recommend an OTA feature of their choice, for making SBTs Flexible Online Airline Reservation Systems.

3.2.3.2 Methodology

Study 3 followed a quantitative research methodology based on self-reporting questionnaire to test the hypothesis. The study used the same data set as obtained in

study 2. Therefore, the steps required for validity, sample size, response rate and scale used in the methodology can be seen in study 2.

The null and alternate hypothesis for the study is given below:

H₈: Users' satisfaction with existing SBTs is different across their choice of four OTA features for making SBTs more Flexible Online Airline Reservation Systems.

H₀: Users' satisfaction with existing SBTs is same across their choice of four OTA features for making SBTs more Flexible Online Airline Reservation Systems.

3.2.3.3 Analysis

In order to test if the respondents approve or disapprove the idea of OTA features integrated into SBTs so as to make them Flexible Online Airline Reservation System, means plot was examined. This was followed by two-way ANOVA analysis to test the satisfaction level of existing Online Airlines Reservation Systems. One of the basic assumptions before performing any analysis of variance is to check for normality of sampling distribution of mean. The sample size for this study (n) was 169, and according to central limit theorem if a random sample of size n is > 30 and it is derived from an infinite population with finite standard deviation, then the standardized sample mean converges to a standard normal distribution [142].

To perform a Two-way ANOVA, respondents were requested to indicate if integration of OTAs features will make Online Airlines Reservation System more flexible or not and also to recommend an OTAs feature (from the given four options of Opaque Fare, Matrix Display, Hotel Search Facility, Alternate Airport Search) for integration into SBTs.

The F-statistic was interpreted in analysis of variance since it is a ratio of the explained variability to the unexplained variability (taking into account the degrees of freedom). A larger F-statistic indicates that more of the total variability is accounted for by the model [143]. Data analysis carried out will be discussed in Chapter 4.

3.3 Phase II: Users' Classification and Interrelationship Testing of Variables

Two studies were conducted in this phase to classify users on the basis of their flexible traveling behavior.

3.3.1 Study 4: Users' Perception on Factors Influencing Flexible Traveling Behavior

This study is to address the 4th research question.

RQ4: How users' perception on factors influencing Flexible Traveling Behavior and Flexible Online Airline Reservation Systems is determined?

3.3.1.1 Rationale

The rationale behind this study was to investigate and explore the concept of users' perception on factors influencing Flexible Traveling Behavior and Flexible Online Airline Reservation Systems.

3.3.1.2 Methodology

In order to gather an in-depth understanding of human behavior and the reasons that govern such behavior, qualitative research was conducted. This qualitative exploratory study adopted a grounded theory approach to investigate the users' perception on their Flexible Traveling Behavior and Flexible Online Airline Reservation Systems. Grounded Theory is a research method in which the theory is developed from the data, rather than the other way around [144], since it is an appropriate way to research a previously little studied area in Information Systems research. According to Strauss [145], "*A grounded theory is one that is inductively derived from the study of the phenomenon it represents. That is, it is discovered, developed, and provisionally verified through systematic data collection and analysis of data pertaining to that phenomenon.*"

Moreover, this methodology provides an ideal and flexible guideline to analyze qualitative data and equip researchers with necessary understanding of underlying concepts to build theories through successive levels of data analysis [146]. Researchers [147]–[149] have recognized this method as an authentic research tool in qualitative data analysis due to its procedural credibility.

The population of this study consisted of travelers who had experience in purchasing tickets through airlines Self-Booking Tools (SBTs) and Online Traveling Agencies (OTAs). This was an important consideration, because travelers with experience in purchasing tickets through SBTs and OTAs could very well understand and relate to what being ‘Flexible Traveling Behavior’ mean from users’ perspective as well as from systems’ perspective.

The data was collected from three methods. (1) Two online travel forums, <http://www.travelblog.com> and www.travellerspoint.com/ (2) Semi-structured in-depth interviews and (3) Focus group. Use of online surveys to collect data has become a popular choice for researchers, with special reference to tourism data [150]. This was mainly due to the flexibility, reach and robustness offered by visual medium of internet. Likewise, in depth interviews and focus group were essentially required in this research, so as to build deeper understanding of respondents’ perspective on Flexible Traveling Behavior and Flexible Online Reservation Systems, which otherwise may not be possible to obtain through online travel forums alone. Moreover, in short interviews researcher is in a position to pick up non verbal cues and even rephrase questions so as to personalize them and make respondents feel at ease to answer them.

The following questions were raised at travel forums:

- Which factors influence upon your Flexible Traveling Behavior?
- Which factors influence upon your perception of a Flexible Online Airline Reservation System?

The semi structured in-depth interview of actual travelers was conducted at Kuala Lumpur International Airport from 11–13th March, 2011. A realistic, flexible and ethically accepted approach was adopted to identify potential research participants. Since this research involved travelers and reservation systems, therefore, Kuala Lumpur International Airport (KLIA) was visited for consecutive three days in order to approach a number of volunteer travelers.

Finally, the focus group interviews were conducted with 3 managers, 5 junior executives and 3 technical experts of three local airlines, namely (1) Malaysian Airline, (2) Fire Fly, and (3) Air Asia. The interviews were held from 15–25th March, 2011.

3.3.1.3 Validity

In order to ensure study's trustworthiness, two methods were employed i.e. Triangulation and Negative Case Analysis.

With regards to triangulation, the three sources and three different data collection methods; online travel forums, semi-structured in-depth interviews and focus group, were employed. This was important to see that data obtained from different independent data sources converged on something similar, or at least do not oppose to each other [151]. The data was analyzed by two authors independently and then discussed together to derive emerging themes, categories and to also ensure credibility. Negative case analysis was performed on the initial derived emerging themes [146], [152]. The purpose was to see if the characteristics of the derived emerging theme sufficiently inculcated the true essence of whole research and were applicable to all cases.

3.3.1.4 Sample Size

31 respondents of the two questions were from travelblog's and travellerspoint forums. 28 travelers were interviewed, and each interview lasted from 10-15 minutes.

Finally, the focus group interviews were conducted with 3 managers, 5 junior executives and 3 technical experts of three local airlines, namely (1) Malaysian Airline, (2) Fire Fly, and (3) Air Asia. The interviews were held from 15–25th March, 2011 (permission letter enclosed see Appendix F). The analysis of the participants from the two online travel forums, semi-structured in-depth interviews and the Focus group are shown in Figure 3.6, Figure 3.7 and Figure 3.8 respectively.

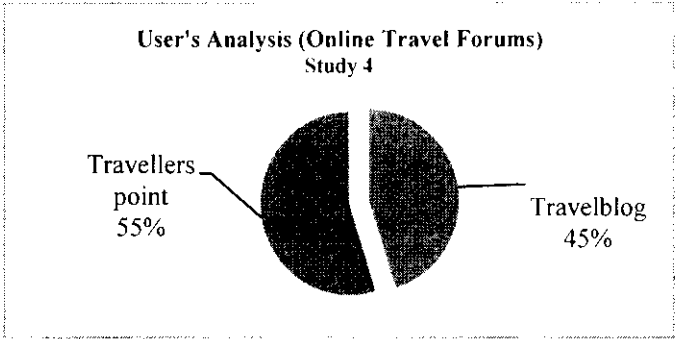


Figure 3.6: User’s Analysis of Participants from Online Travel Forums

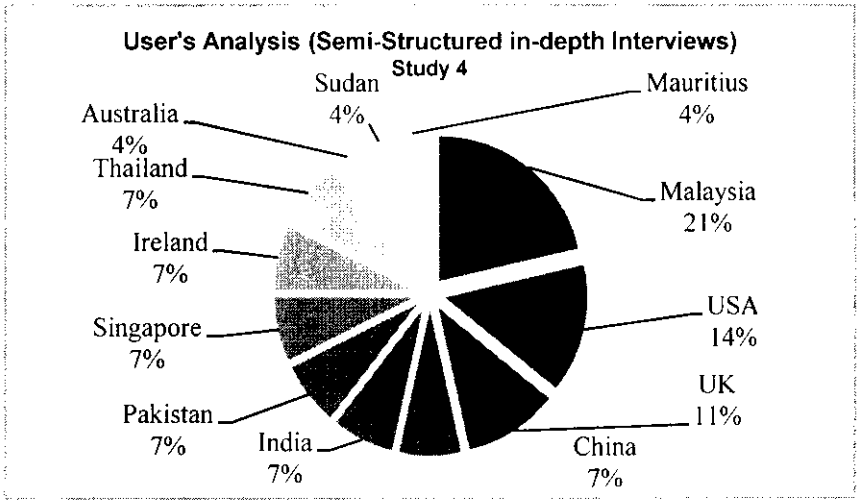


Figure 3.7: User’s Analysis of Participants from In-depth Interviews

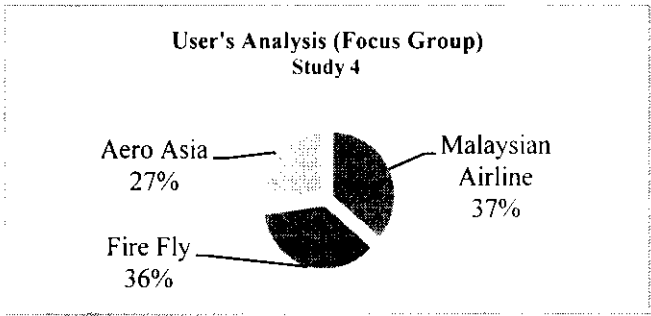


Figure 3.8: User’s Analysis of Participants from Focus Group

3.3.1.5 Response Rate

43 responses were received from online travel forums. Out of 43, 12 cases were rejected due to the ambiguous respondents yielding a response rate of 72% of the total responses. 28 responses in-depth interviews and 11 responses from focus group were collected with no rejected cases. The demographics of online travel forums, in-depth interviews and focus group can be seen in Chapter 4.

3.3.1.6 Scale

The analysis of interview transcripts was based on an inductive approach which is meant to identify emerging patterns in the data by using thematic codes. Inductive analysis looks for emerging patterns, themes and categories through analysis of data and opposes imposition of the same, prior to data collection and analysis [153].

3.3.1.7 Analysis

The data collected from three different sources was examined for triangulation. It depicted a similarity pattern, especially in case of data collected from online travel forums and in-depth interviews of travelers at KLIA.

Data analysis of later, however, provided a more detailed perspective of travelers flexible behavior by incorporating socio-economic factors and societal influences. The focus group, being technical experts, however significantly contributed towards identifying factors that may influence upon perceived flexibility of reservation systems. After giving much thought process to results as shown in Chapter 4, Section 4.4.1, 6 themes emerged under factors influencing upon Flexible Traveling Behavior and 3 themes emerged under factors influencing upon perceived flexibility of a reservation system as shown in Table 3.2.

Table 3.2: Emerging Themes on Factors Influencing upon FTB and PF

| Emerging Themes | |
|--|---|
| Factors Influencing Upon Flexible Traveling Behavior | Factors Influencing Upon Perceived Flexibility (PF) of an Online Airline Reservation System |
| 1. Travelers' flexible behavior is moulded by their traveling consciousness. | 1. Systems perceived flexibility is influenced by its Perceived Usability. |
| 2. Travelers' flexible behavior is moulded by their belief that they have the required digital skills. | 2. Systems perceived flexibility is influenced by end user support. |
| 3. Travelers' flexible behavior is moulded by their self-belief as flexible travelers. | 3. Systems perceived flexibility is influenced by comparison of features on the actual level of effect regarding to complete the reservation process. |
| 4. Travelers' flexible behavior is moulded by societal influences. | |
| 5. Travelers' flexible behavior is moulded by how they attribute a cause to their traveling behavior. | |
| 6. Travelers' flexible behavior is moulded by their prior traveling experiences. | |

3.3.2 Study 5: A Study to Classify Users' on the Basis of Flexible Traveling Behavior

This study is to address the 5th research question.

RQ5: How to classify Users' on the basis of their Flexible Traveling Behavior into High, Medium and Low flexible and how to investigate interrelationships among System's Flexibility, Users' Flexibility and Perceived Usability of existing Online Airline Reservation Systems?

3.3.2.1 Rationale

The study purpose was to (i) classify users' on the basis of their Flexible Traveling Behavior (Highly Flexible, Medium Flexible, Low Flexible) and (ii) to investigate interrelationships among System's Flexibility, User's Flexibility and Perceived Usability of the Online Airline Reservation Systems.

3.3.2.2 Methodology

The quantitative research methodology was adopted using survey to address the following four hypotheses.

H₉: Users can be classified on the basis of their Flexible Traveling Behavior.

H₁₀: User's Flexible Traveling Behavior and their Perceived Usability is correlated.

H₁₁: User's Flexible Traveling Behavior and System's Flexibility is correlated.

H₁₂: Perceived Usability of Online Airline Reservation Systems is not affected by users' Flexible Traveling Behavior after adjusting for the effect of the covariate, System's Flexibility.

3.3.2.3 Validity

In order to ensure that items on the questionnaire were related to the constructs being measured, the Content Validity Index (CVI) was used. According to Burns and Grove [135] Content Validity is obtained from three sources: literature, representatives of the relevant populations, and experts. The Content Validity Index (CVI) developed by Waltz and Bausell [136] was used in this study.

Three human factor students with expertise in usability were asked to rate each item on the questionnaire based on Relevance, Clarity, Simplicity and Ambiguity on the four-point scale. The items that had CVI over 0.75 remained and the rest were discarded. The remaining items were modified, based on the experts' opinions.

3.3.2.4 Sample Size

To investigate the above hypotheses, 90 random cases were selected for validating the results of transformation scale and to perform preliminary interrelationship of variables before performing the final analysis on the data set of 273 responses.

3.3.2.5 Response Rate

Out of 273, 90 random cases were selected as shown in Figure 3.9. Randomly selected cases will be used for transformation scale.

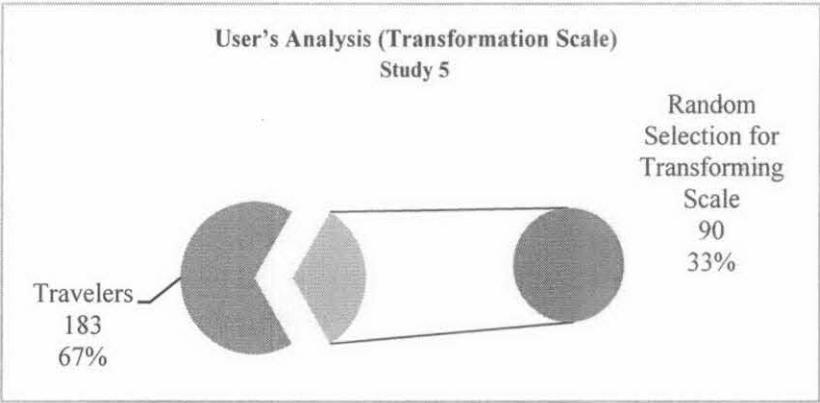


Figure 3.9: User's Analysis of Participants for Transformation Scale

3.3.2.6 Scale

Five-point Likert mode was used ranging from “strongly agree” to “strongly disagree.” Respondents’ responses were scored as: for the “strongly agree” response was assigned a score of 5, while for the “strongly disagree” response was assigned a score of 1. Consequently, users’ gaining higher scores in a certain scale showed stronger preferences toward the specific scale.

3.3.2.7 Analysis

Section B of the questionnaire consisted of questions on Service Quality Attributes (SQAs) of an airline that users’ are ready to forgo or compromise on, in order to become flexible travelers. By opting to become flexible travelers, users would get discounted fares at the cost of being unaware of three hidden characteristics of their traveling itinerary (1) their seat details/confirmation, (2) date of flying confirmation and (3) time of flying confirmation. All questions posted in this section were uni-directional and designed as such that the extent to which a user would agree with a

particular statement reflected his/her flexible behavior in terms of flying on flexible dates/times. The following unidirectional scale was used, where 1 denoted ‘Highest’ and 5 denoted ‘Least’ flexibility in terms of compromising on service quality attributes of an airline as shown in Table 3.3.

Table 3.3: Uni-directional Scale to Measure Users’ Flexibility

| Rate your priorities for the following service quality attributes of an airline in terms of their importance. | Highest | High | Neutral | Low | Least |
|---|---------|------|---------|-----|-------|
| | 1 | 2 | 3 | 4 | 5 |
| 1 Flying date confirmation | | | | | |
| 2 Flying carrier confirmation | | | | | |
| 3 Flying time confirmation | | | | | |
| 4 Number of stop-over | | | | | |
| 5 Number of connected flights | | | | | |
| 6 Ticket class (economy/business) | | | | | |
| 7 Seat specifications | | | | | |
| 8 Discounted Airfares | | | | | |
| 9 Destination/Source Airport | | | | | |
| 10 Immediate confirmation of itinerary on purchase of ticket | | | | | |

Transformation Scale – Once the score of the respondents was recorded, it required adoption of a validated mechanism to test the hypothesis **H₉**, whereby individual ratings of participants on 10 service quality attributes could be transformed into singular unit, such as a score or product.

In a study conducted on aesthetic appraisal of 5 most popular aviation websites in the world, a similar methodology based on transformation of ratings into a product score, has been used [154]. Respondents in the study evaluated 5 popular SBTs of airlines on the given parameters by assigning a score of 1 (Very Low) to 5 (Very High). Then their score was transformed into a product, by examining frequency of occurring of each rating (1, 2, 3, 4, 5) and multiplying that frequency (e.g., 1 occurs two times, 2 occurs zero times, 3 occurs four times, 4 occurs four times, 5 occurs zero times) with that of transforming scale product. The final total is added to obtain a unique product score, which in case of given example 2 as shown in Table 3.4. Data analysis carried out will be discussed in Chapter 4.

Table 3.4: Transformation Scoring Scale

| Rating | VL | L | N | H | VH |
|------------------------------------|----|----|---|----|----|
| | 1 | 2 | 3 | 4 | 5 |
| Scale | -2 | -1 | 0 | +1 | +2 |
| Rating Frequency | 2 | 0 | 4 | 6 | 0 |
| Product (Rating Frequency * Scale) | -4 | 0 | 0 | 6 | 0 |
| Product Score | 2 | | | | |

H₁₀ investigated interrelationship between users' Flexible Traveling Behavior (FTB) and their Perceived Usability of FOARS. For this investigation, Kendall's Tau (see Section 3.5.9) method for examining bivariate correlations was selected because it essentially met the nonparametric conditions of the study. First, the study used a small data set of 62 respondents only, reporting their Perceived Usability. Secondly, users were classified into three categories of flexible behavior (high, medium, low) on the basis of their Users' Flexibility score. The correlation analysis was performed and significance level was interpreted. Data analysis carried out will be discussed in Chapter 4.

H₁₁ investigated interrelationship between users' FTB and System's Flexibility (comprised of adaptability, adaptivity, and personalisation). Pearson Correlations was computed and significance level was checked and interpreted accordingly. Data analysis carried out will be discussed in Chapter 4.

H₁₁ called for the further investigation in order to ascertain interrelationship between users' Flexible Traveling Behavior and System's Flexibility. Consequently, in **H₁₂**, Perceived Usability of Flexible Online Airline Reservation Systems (PU) was included as a dependent variable to investigate how the two variables, (1) Users' Flexible Traveling Behavior and (2) System's Flexibility together predict Perceived Usability of Online Airline Reservation System. Moreover, since the interrelationship between users' Flexible Traveling Behavior and Perceived Usability of Flexible Online Airline Reservation Systems is already ascertained in **H₁₀**, therefore, users' Flexible Traveling Behavior was taken as a fixed factor and System's Flexibility was included as a Covariate, to reduce within group error variance and to eliminate confounds.

ANOVA includes one or two continuous variables that predict the outcome or dependent variable. However, continuous variables such the one that are not part of the main experimental manipulation but may have an influence on dependent variable are known as covariates in the Analysis of Covariance (ANCOVA). ANCOVA takes into account confounding variables to give a clear measure of effect of the experimental manipulation, and the analysis is performed as such to first examine influence of independent or fixed factor (users' FTB) on dependent variable (Perceived Usability of Flexible Online Airline Reservation Systems) and then experiment is manipulated by introducing a covariate (System's Flexibility).

One important assumption was checked before performing ANCOVA, i.e., independence of the covariate and treatment effect. This assumption requires that covariate (System's Flexibility) should not be different across three users' Flexible Traveling Behavior Groups in the analysis. To meet this assumption, One Way Independent ANOVA was performed, with Perceived Usability of Flexible Online Airline Reservation System across three groups as an independent variable, and System's Flexibility as an outcome variable. This analysis should be non-significant to meet the assumption of ANCOVA. This was followed by performing ANCOVA results are interpretation. Data analysis carried out will be discussed in Chapter 4.

3.3.3 Research Way Forward

The Matrix display and hotel search features are unique in the sense of incorporating multiple sources reservation information, however from integrating into the proposed framework of SBTs perspective, they are not very feasible since it requires merger of multiple information resources, that might not be acceptable to an airline due to its privacy policy and other regulations. On the contrary, alternate airport search is related to provide additional information, and the extent to which a traveler is willing to be flexible in identifying his/her destination sources. This feature seems practical and has implications for integration into SBTs. Finally, unlike other OTA innovations, the opaque fare mechanism depends on hidden characteristics of the traveling plan, thus leveraging upon traveling behavior of leisure travelers, who are always up for

grabs and less sensitive to traveling plans. The findings of the studies showed that this OTA feature to be the most recommended for integration into SBTs as shown in Figure 3.10.

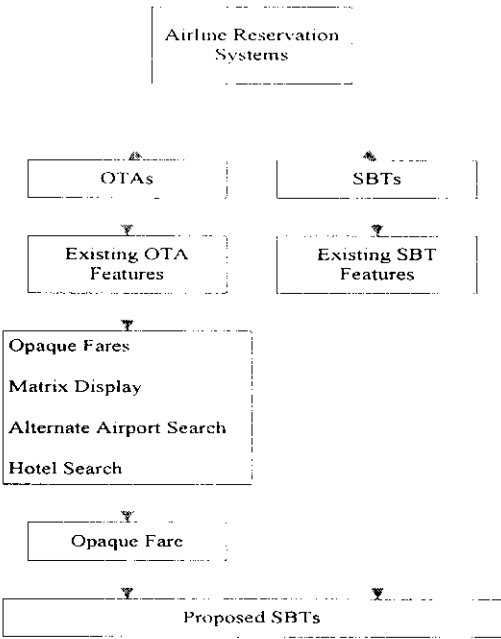


Figure 3.10: Proposed FOARS after Integrating Opaque Fares into SBTs

Since we are investigating flexibility from both, system point of view and users’ perspective, integration of opaque fares concept into SBTs would increase the usability of the system by way of improving System’s Flexibility and by making users’ more flexible in their decision making as shown in Figure 3.11.

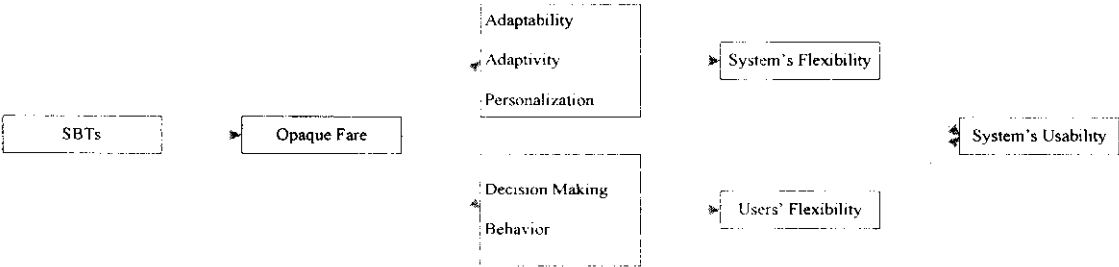


Figure 3.11: Increased Usability by Improving SF and Users Flexible Decision

As discussed above, flexibility is referred to its ability to respond to internal or external changes. Change can be defined as the transition over time which requires change agent. Researchers argued that “if the change agent is external to the system, then the change under consideration is a *flexible*-type change” [12]. Therefore, in case of SBTs incorporated with opaque fares would serve the role of external change agent

by way of providing flexibility in users' decision making. Similarly, "if the change agent is internal to the system, then the change under consideration is an *adaptable*-type change" [12]. Thus the provision of opaque fares into SBTs also serves the role of internal change agent by way of providing the capability of accepting changed decisions. If no change agent exists, then the system is rigid (no change can occur). Since provision of opaque fares could make users flexible and also increases the adaptability of the system, it is expected that the usability of the system would be enhanced.

3.4 Phase III: Case Study to Test the Proposed Framework

Phase III was designed to study the interrelationship between System's Flexibility, Users' Flexibility and Perceived Usability of Online Airline Reservation Systems and to determine the Perceived Usability of the existing and proposed systems. In order to investigate the relationship between Perceived Usability and travelers Flexible Traveling Behavior (FTB) with existing and proposed systems the following three research questions were investigated:

- **RQ6:** How do Service Quality Attributes of airlines and External Variables jointly predict flexible behavior of travelers?
- **RQ7:** How does user Perceived Usability with existing and proposed system differs?
- **RQ8:** Is there a multivariate main effect of user's Flexible Traveling Behavior (High, Medium and Low) on effectiveness, efficiency and satisfaction of the proposed system?

3.4.1 Rationale

The case study was designed in order to investigate the relationship between user Perceived Usability and travelers Flexible Traveling Behavior with the existing and the proposed Online Airline Reservation Systems.

3.4.2 Methodology

The quantitative research methodology, based on investigating three (03) research questions through survey questionnaires was adopted. Users' were given hard copies of the questionnaire with following sections.

Section A of the questionnaire was designated to collect demographic profile of the respondents. Section B consisted of service quality attributes of an airline that users' are ready to forgo or compromise in order to become flexible travelers. By opting to become flexible travelers, users will get discounted fares at the cost of not knowing their seat confirmation, date of flying confirmation and time of flying confirmation. All questions posted in this section were uni-directional and designed as such that the extent to which a user would agree with a particular statement reflected his/her flexible behavior in terms of flying on flexible dates/times. Section C consisted of questions that particularly addressed the external factors that may influence upon the Perceived Usability of the system. The details of each measuring construct have already been discussed in Chapter 2. Section D consisted of questions to measure Perceived Usability of the system.

To answer the above research questions the following hypotheses were created:

- **H₁₃:** Flexible behavior of travelers cannot be predicted by the Service Quality Attributes and External Variables.
- **H₁₄:** User Perceived Usability with existing and proposed systems is different across the three groups.
- **H₁₅:** There are differences among effectiveness, efficiency and satisfaction caused by the users' Flexible Traveling Behavior.
- **H₁₆:** Effectiveness, efficiency and satisfaction in the proposed FOARS is higher for users with highest flexible behavior.

3.4.3 Validity

Validity technique known as Item Discrimination Index was employed in this study [155]. Item Discrimination Index indicates how adequately an item separates or discriminates between high scorers and low scorers on an entire test [157]. It is a measure of difference between the proportion of high scorers answering an item correctly and the proportion of low scorers answering the item correctly. Andy Field [156] argues that item discrimination means that respondents with different score should also differ in the construct of researchers' interest. Kelley [158] suggested that item discrimination should be based upon following two corollaries and pose unidirectional questions to respondents, so that the degree of their agreement with a particular statement could be used to discriminate them with respondents with certain levels of disagreements over the same statement.

- Respondents with the same score should be equal to each other along the measured construct.
- Respondents with different scores should be different to each other along the measured construct.

To meet the item discrimination validity requirement, the questionnaire was designed with uni-directional questions. This paved way to discriminate respondents on the basis of *the degree to which they agree being flexible travelers or not*.

3.4.4 Sample Size

To investigate the above three (03) research questions, more than 500 travelers were requested to fill in the survey questionnaire during the Malaysian Association of Tour and Travel Agents (MATTA) fair 2011. MATTA fair is a world known exhibition in the tourism industry which is held every year. Three (03) days (11-13th March 2011) were spent at Putra World Trade Centre (PWTC), Kuala Lumpur (Appendix G).

3.4.5 Response Rate

273 responses were received, yielding a response rate of 54.6% of the total population surveyed. However, 23 cases were dropped due to the ambiguous respondents yielding a response rate of 50%.

3.4.6 Paper Prototype

A paper prototype as shown in Figure 3.12 and Figure 3.13 was developed to get the users' response to classify them into different categories.

Book a Flight
- One Way Ticket -

From :

To :

Depart :

Booking type : ☒ Flexible ☐ Inflexible

No. of days to be flexible :

| Mon | Tue | Wed | Thu | Fri | Sat | Sun |
|-----|-----|-----|-----|-----|-----|-----|
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | | | |

Day to be flexible : 3 days = 20% discount
6 days = 30% discount
9 days = 40% discount
12 days = 50% discount

Available flight

Adult :

Children :

Infants :

Class :

Book Now

Figure 3.12: Prototype of a Flexible Booking Window for Flexible Travelers

Book a Flight
- One Way Ticket -

From :

To :

Depart :

Booking type : ☐ Flexible ☒ Inflexible

Select exact date :

Adult : Children : Infants :

Class :

Book Now

Figure 3.13: Prototype of a Flexible Booking Window for Inflexible Travelers

3.4.7 Usability Evaluation of Prototype

The usability of a prototype named as interface B was inspected through heuristic evaluation. 3 HCI graduates who had usability evaluation and testing experiences served as expert evaluators to evaluate the usability. An evaluation sheet was provided to each evaluator that contained a series of usability guidelines based on the well-recognized Research-Based Web Design and Usability Guidelines book [159]. The selected guidelines were adapted to be presented in a checklist format (Appendix H). The evaluators were requested to assign each guideline a problem severity rating from 0 (no problem) to 4 (usability catastrophe) based on the frequency, impact and persistence of the problem. According to Nielsen and Mack [160], using the mean of a set of severity ratings from three evaluators is satisfactory for many practical usability inspection purposes.

Furthermore, the evaluators were also requested to provide redesign suggestions for each problem identified. Based on all evaluators' evaluation and the results from studies, a new interface B (Prototype) was designed.

3.4.8 Scale

Questionnaire was designed using psychometric scales, which are commonly used in psychological research [79]. This technique was employed because psychometric scales tend to prompt an individual to respond to various questions that pertain to a given context and according to Davis [79] "*responses of individuals are an indication of their internal belief*". The participants were provided a hardcopy of the questionnaire for indicating their response by evaluating the prototype by using a 5 point likert scale ranging from (1) "Strongly Disagree" to (5) "Strongly Agree" (Appendix C).

3.4.9 Analysis

The analysis on RQ6, RQ7 and RQ8 are as follows:

Analysis of RQ6 – The first research question in the case study was investigated by performing statistical procedure in two steps. In Step 1, Pearson Correlation Coefficients of the ten quality service attributes along with external variables was computed to determine their association with flexible behavior of travelers and to also ascertain their individual range and strength of association. In Step 2, Multiple Regression Analysis (MRA) was performed to determine how service attributes quality and external variables jointly determine flexible behavior of travelers. MRA predicts values on a quantitative outcome variable, using several other predicting variables [161]. Data analysis carried out will be discussed in Chapter 4.

Analysis of RQ7 – In order to investigate the second research question of the case study i.e. how Perceived Usability of existing and proposed systems differs among users' with high, medium and low Flexible Traveling Behavior?, a two-way ANOVA analysis was performed. As mentioned above, one of the basic assumptions before performing any analysis of variance is to check for normality of sampling distribution of mean. The sample size for this study (n) was 250, and according to central limit theorem if a random sample of size n is > 30 and it is derived from an infinite population with finite standard deviation, then the standardized sample mean converges to a standard normal distribution [142].

Two-way ANOVA tested the *Effectiveness, Efficiency and Satisfaction* of the existing and proposed systems for travelers with High, Medium and Low Flexible Traveling Behavior. The F-statistic was interpreted in analysis of variance since it is a ratio of the explained variability to the unexplained variability (taking into account the degrees of freedom). A larger F-statistic indicates that more of the total variability is accounted for by the model [143].

Analysis of RQ8 – Third research question of the case study was examined with the help of MANOVA to see if there is a multivariate main effect of user's Flexible Traveling Behavior on the proposed system's effectiveness, efficiency and satisfaction. Multivariate normality requires that any linear combination of the dependent variables must be distributed normally. This assumption was checked by examining pair wise nonlinear relationships between dependent variables using scatter

plots. The second assumption of multivariate analysis is homogeneity of the covariance matrices. It was met by examining Box's M, which tests the hypothesis that the covariance matrices of the dependent variables are significantly different across levels of the independent variable as show in Chapter 4, Section 4.8.1.2.

The overall F test for the three dependent variables was examined in Multivariate Tests by analyzing the statistic called Wilks' lambda (λ), and the F value associated with that which is significant at $p < 0.01$. Lambda is a measure of the percent of variance in the Dependent Variables that is *not explained* by differences in the level of the Independent Variable. If the overall F test is significant, then it is a common practice to go ahead and look at the individual dependent variables with separate ANOVA tests. This was followed by a univariate ANOVA and Post-hoc multiple comparison tests that shows statistically significant effect on three dependent variables. Data analysis carried out will be discussed in Chapter 4.

3.5 Statistical Methods

In this thesis, different statistical methods have been chosen to analyse the data. The methods were, descriptive analysis, pearson coefficient correlation, reliability analysis, analysis of variance, analysis of covariance, multivariable analysis of variance, multiple regression analysis, Post Hoc Scheffe's Test and Kendall's Tau. The following subsection describes the statistical formulas used in this research.

3.5.1 Descriptive Analysis

Descriptive analysis is used to describe and summarize a collection of data in a clear, understandable and meaningful manner which allows simple interpretation of the data. There are two basic approaches, one is numerical and, second is graphical. Using the first approach i.e. numerical method, one might compute statistics such as mean and standard deviation. In graphical method one might create plots that contain detailed information about the distribution. Stem and leaf display and a box plot are famous plots in graphical method [162].

3.5.2 Pearson Coefficient Correlation

The correlation coefficient was developed by Karl Pearson from the idea introduced by Francis Galton in 1880s [163], [164]. Sometime, it is also termed as “Pearson’s r ”. In statistics, correlation (linear dependence) measures the degree of association between two variables X and Y . It is a value between -1 and +1 inclusive. A positive value implies a positive association between the two variables (large values of X tend to be associated with large values of Y and small values of X tend to be associated with small values of Y). A negative value implies a negative or inverse association between the variables (large values of X tend to be associated with small values of Y and vice versa). It is defined as the covariance of the two variables divided by the product of their standard deviations.

3.5.3 Reliability Analysis

In statistics, reliability is treated as the consistency of a set of measurements or it is also referred as a measuring instrument which is used to describe a test. It is inversely related to the random error [165]. Reliability is said to be sample dependent as it is the property of the scores of a measure rather than the measure itself. Cronbach’s alpha is the most common consistency measure which is typically interpreted as the mean of all possible split-half coefficients [166]. Cronbach’s alpha is a more generalized form of Kuder-Richardson Formula 20 [166] used for estimating internal consistency. Reliability may be defined as the proportion of true score variability that is captured across respondents, relative to the total observed variability [167].

3.5.4 ANOVA

The aim of Analysis of Variance generally known as ANOVA is to test the significant difference between group means. ANOVA is commonly used if the user needs to compare performance of more than two parameters. ANOVA generalizes t-test to more than two groups by providing a statistical test of whether or not the means of several groups are all equal. Therefore, the advantage of ANOVA over t-test is

ANOVA can detect the effect of interaction between variables, and to test more complex hypothesis about the existing problem [168]. If the result indicates a significant difference, then it would be followed by post-hoc test to identify which mean of result is different.

ANOVA is a technique that was firstly proposed by R. A. Fisher in a 1918 article "*The Correlation Between Relatives on the Supposition of Mendelian Inheritance*". In 1921, his first application of the ANOVA was published which was later included in his book "*Statistical Methods for Research Workers*". ANOVA is used to compare group means [169]. ANOVA uses two hypotheses to determine the result, namely null hypothesis and alternate hypothesis.

3.5.5 ANCOVA

The aim of Analysis of Covariance generally known as ANCOVA is to compare one variable in 2 or more groups taking into account variability of other variables, called covariate [170]. ANCOVA is a technique that sits in between analysis of variance and regression analysis [171]. It combines one-way or two-way ANOVA with linear regression. In other words, it is a General Linear Model (GLM) with a continuous outcome variable and two or more forecaster variables where at least one is continuous and one is categorical. Continuous variable is always quantitative or scaled while the categorical variable is nominal or non-scaled.

3.5.6 MANOVA

Multivariate analysis of variance generally known as MANOVA is a generalized form of ANOVA which is used to analyze data that involves two or more than two dependent variables [172]–[175]. There are three basic advantages of MANOVA analysis. Firstly, it helps in finding the interactions among dependent variables, secondly, it helps in finding the interaction among independent variables and, thirdly, it helps in finding the effect of independent variable(s) on the dependent variable(s) [176].

3.5.7 Multiple Regressions

The term regression was first time introduced by Francis Galton in 1900s [177]. Galton's work was later extended by Udny Yule [178] and Karl Pearson [179] to a more general statistical context. In statistics [161], this technique is used to predict the relationship between one dependent variable and one or more independent variable(s). This technique is able to form a method of least square where sum of squared residuals between the regression plane and the observed values of the dependent variable are minimized [180].

3.5.8 Post Hoc Scheffe's Test

Post hoc tests are useful to explore the differences among means. It provides specific information on which means are significantly different from each other. Therefore, Post hoc tests are performed where researchers has already conducted F-test with a factor that consists of more than two means [181]. In statistics, there are many procedures to perform Post hoc tests, however, Scheffe's techniques is a most popular and flexible method introduced by Henry Scheffe. It is a method to adjust significance levels in linear regression analysis for multiple comparisons.

3.5.9 Kendall's Tau

Kendall's Tau is used to measure the strength of the relationship between the two variables. It is a measure of correlation which is carried out on the ranks of the data [182]. For any sample of n observations, there are $[n(n-1)/2]$ possible comparisons of points (X_i, Y_i) and (X_j, Y_j) . Assume C is a number of pairs that are concordant, and D is a number of pairs that are not concordant than Kendall's Tau can be calculated [183].

3.6 Chapter Summary

In this chapter, we discussed the overall methodology of the thesis whereby existing Online Airline Reservation Systems were examined to assess the flexibility and usability of the systems. This chapter was divided into three phases and each phase contains one core research objective which was achieved through quantitative and qualitative techniques to assess System's Flexibility, Users' Flexibility and Perceived Usability of the systems. A redesign solution for enhanced usability for more Flexible Online Airline Reservation Systems was developed based on HCI guidelines and the flexibility tactics used in online travel agencies. A new Flexible Online Airline Reservation System design was applied, which led to a proposed interface with the integration of opaque mechanism. The two interfaces were used in the case study. Participants were requested to complete the evaluation of the existing and proposed interfaces.

CHAPTER 4

RESULTS AND ANALYSIS

4.0 Chapter Overview

The research methodology discussed in Chapter 3 was divided into three phases addressing one core research objective with corresponding research questions in each phase. The same pattern is followed in this chapter to organize the results obtained through the corresponding hypotheses. To achieve the 1st research objective, Section 4.1, 4.2 and 4.3 are devoted to presents the results obtained from the three studies conducted in Phase I answering the corresponding research questions RQ1, RQ2 and RQ3, respectively. To attain the 2nd research objective, Section 4.4 and 4.5 are dedicated for the results obtained from the two studies conducted in Phase II answering the corresponding research questions RQ4 and RQ5, respectively. To conquer the 3rd research objective, Section 4.6, 4.7 and 4.8 presents the results obtained from the case study answering the corresponding research questions RQ6, RQ7 and RQ8, respectively. Section 4.9 summarizes the overall chapter.

4.1 Phase I: User Needs Associated to System's Flexibility

This study is to address the 1st research question.

RQ1: What are the issues with flexibility of Online Airline Reservation Systems, whether or not flexibility is one of the reasons for users not using such systems?

4.1.1 Descriptive and Reliability Analysis

72% of the online experienced ticket buyers found the systems to be consistent with

respect to the usage of terms and the position of messages on the screen. Among the experienced buyers, 71% agreed that the current online reservation systems facilitate learning through textual descriptions and are presented in a manner that is not confusing. 35% of the experienced users found online reservation systems were easy to use or handle with little need to read instructions. 61% of the participants agreed to have no difficulty in learning to operate the system.

Pearson correlation coefficients were computed in order to test the relationships between each factor and the usability of online reservation systems. Table 4.1 shows the average item scores and standard deviations within each of the four groups (FR, NFR, flexibility and required resources/skill set).

Table 4.1: Coefficient of the Factors Affecting Usability of Online Systems

| Factors | No. of Items | Mean per Factor | S.D. | Cronbach's α |
|---|---------------------|------------------------|-------------|---------------------------------------|
| Functional Requirements | 9 | 1.6 | 0.7 | 0.74 |
| Non-Functional Requirements | 20 | 2.8 | 1.0 | 0.76 |
| <i>Consistency</i> | 5 | 2.2 | 0.9 | 0.90 |
| <i>Ease of Use</i> | 5 | 3.2 | 0.9 | 0.62 |
| <i>Learnability</i> | 4 | 3.8 | 1.1 | 0.93 |
| <i>Security</i> | 3 | 3.4 | 0.8 | 0.63 |
| <i>Trust</i> | 3 | 3.6 | 0.9 | 0.71 |
| Flexibility | 11 | 2.8 | 0.7 | 0.81 |
| <i>Satisfaction</i> | 4 | 3.2 | 0.8 | 0.74 |
| <i>User-guidance</i> | 4 | 3.2 | 0.8 | 0.76 |
| <i>Simplicity</i> | 3 | 2.3 | 1.0 | 0.82 |
| Required Resources & Skill Set | 5 | 3.1 | 0.6 | 0.66 |

The largest group-wise score (3.1 with a standard deviation of 0.6) was attained for Required Resources and Skills. Even though this is almost the mean of the five-point Likert scale, this indicates that this factor was of high preference among customers. Ranked next were Flexibility (2.8 with a standard deviation of 0.7) and the other NFRs (2.8 with a standard deviation of 1.0), respectively. This close ranking suggests that a notable preference of customers concerning these two aspects. The lowest item score is that of the FRs (1.6 with a standard deviation of 0.7), indicating that the extent to which online reservation systems may provide incorporation of additional support features such as online cancellation, online modification, online

transfer and online reservation, remains uncertain as per the perception of the customers.

Cronbach's α analysis was performed to assess the reliability of the variables used in the research constructs. Reliability analysis was computed on each section/group measuring different attributes associated with the hypothesized research constructs.

- Flexibility: This factor gained the highest Cronbach's α score of 0.81
- NFR: This factor gained the second highest Cronbach's α score of 0.76
- FR: This factor gained the third highest Cronbach's α score of 0.74
- Required Resources and Skills: This factor gained Cronbach's α score of 0.66

4.1.2 Hypothesis Testing H₁

H₁: Non-functional Requirements are perceived to have an impact on the usability of OARS.

The factor of NFR was differentiated into separate dimensions to capture the customer's perception of consistency, ease of use, learnability, security, and trust. Table 4.1 shows that the construct "Learnability" among the NFRs had the highest mean of 3.8 and a standard deviation of 1.1, which may indicate an inclination of the users toward learning how to handle advanced features of online reservation systems. Moreover, this construct also has the highest Cronbach's α score of 0.93. The items in the Learnability construct were related to the satisfaction of users with reading text on the screen, the sequence of screens, the organization of information and supportive information such as online help, messages, and documentation provided by the systems before, during, and after completing the tasks. This is followed in rank by the extended construct of "Trust" with a mean of 3.6 and a standard deviation of 0.9. The extended construct of Trust was related to the risk in providing personal accounts information online and the reliability on experienced travel agents in finding better flights and packages. The survey indicates that customers bestowed upon traveling agents greater trust and reliability believing they could help in finding them better

traveling packages. This construct has the third highest Cronbach's α score of 0.71. The extended construct of “Consistency” has the second highest Cronbach's α score of 0.90. The questions asked with regards to this construct included various aspects of how information is presented in the interface and used by customers of online reservation systems. The items in the Consistency construct addressed finding the consistency in use of terms throughout the system, the positioning of messages on the screens, organization of screens, and the use of text-based instructions.

The correlation between NFR and the usage of the systems was observed to be $r = 0.7$ with $p < 0.01$. This shows the significance of the relationship; the *hypothesis is accepted*.

4.1.3 Hypothesis Testing H₂

H₂: Functional Requirements are perceived to have an impact on the usability of OARS.

Table 4.2 presents the flexibility of existing systems. 66% of the experienced users stated that they never tried to make online changes in their traveling schedule. 15% of the respondents reported to have been successful, 11% reported to have been unsuccessful, and the remaining 8% reported to have not seen such an option in existing online systems. 64% of the respondents claimed that they never tried online cancellation. 8% reported to have been successful in making cancellation changes, 16% reported to have been unsuccessful, whereas the remaining 12% reported to have not seen such an option in the systems. 80% of the respondents claimed that they never tried an online transfer of a ticket. 1% reported to have been successful, 11% reported to have been unsuccessful, whereas the remaining 8% reported to have not seen such an option in the system. 72% of the respondents answered that they never tried online correction of errors. 9% reported to have been successful, 15% reported to have been unsuccessful, whereas the remaining 4% reported to have not seen such an option in the system. Lastly, 58% of the experienced users reported that they never tried reservations in online systems. Interestingly, no one reported to be successful, whereas the remaining 15% reported to have not seen such an option in the system.

Table 4.2: Flexibility of Existing Systems

| Flexibility of Existing Systems | Never | Unable to do so | Option not available | Successful |
|--|--------------|------------------------|-----------------------------|-------------------|
| Have you ever tried to make changes in your traveling dates online? | 66% | 11% | 8% | 15% |
| Have you ever tried to cancel your ticket online? | 64% | 16% | 12% | 8% |
| Have you ever tried to transfer your ticket to someone else online? | 80% | 11% | 8% | 1% |
| Have you ever tried to correct typos errors online? | 72% | 15% | 4% | 9% |
| Have you ever tried to reserve a ticket for few days with the intension to buy it later? | 58% | 27% | 15% | 0% |

The relationship between FR and the usage of the systems was observed to have $r = 0.18$ with $p > 0.01$. This shows that the relationship is not significant; the *hypothesis is rejected*.

4.1.4 Hypothesis Testing H_3

H_3 : The perceived flexibility of OARS affects the usability of such systems.

The factor of flexibility was investigated from different viewpoints to examine the perception of the customers concerning satisfaction, user guidance, and simplicity of use. 45% agreed that the data entry was flexible, 35% perceived flexible user guidance, and 53% saw clear indications for completing the process. 40% claimed to be satisfied with the total number of steps required to accomplish the task. Furthermore, 48% were satisfied with the ease of completing the tasks and 41% with the total time systems take to complete the tasks. 30% of the respondents agreed that the online systems support quick and easy recovery from mistakes, while 32% of the respondents did not agree. The remaining 38% of the respondents remained neutral to this. 30% of the respondents agreed that the current online reservation systems provide effective linkages with other travel-related partners (e.g. links to other airline reservation system in case of connected flights). 25% did not agree, whereas the remaining 45% remained neutral on this. 67% of the respondents claimed to have

been uncertain about how to fix errors if these occur; 85% of the respondents preferred travel agents to make changes in their flight schedule. 72% of the respondents preferred travel agents for reserving tickets. 51% of the inexperienced respondents refrained from online shopping so as to avoid making online payments. 51% of the respondents considered travel agents to be more reliable. Two extended constructs of the “Flexibility” factor, namely, “User-guidance” and “Satisfaction” have the highest mean score of 3.2. The reliability of both the constructs is also observed to be good with a Cronbach's α score of 0.76 and 0.74, respectively.

The relationship between perceived flexibility of online reservation systems and the usage of such systems was observed to be $r = 0.69$ with $p < 0.01$. This shows a high significance of the relationship; the *hypothesis is accepted*.

4.1.5 Hypothesis Testing H₄

H₄: Functional Requirements of OARS are inversely associated with the flexibility of the systems.

The relationship between FR of online reservation systems and the flexibility of the systems was observed to have $r = 0.28$ with $p < 0.01$. This shows that the relationship is mildly significant; the *hypothesis is accepted*.

4.1.6 Hypothesis Testing H₅

H₅: The availability of resources and skills set influence upon the usability of OARS.

10% of the respondents claimed to have no Internet connection available; 30% claimed to have no or little knowledge of online reservation systems; the remaining 60% reported to have no credit or debit card available.

The relationship between available resources and the usage of online reservation systems is observed to have $r = 0.32$ with $p < 0.01$. This shows that the relationship is mildly significant; the *hypothesis is accepted*.

4.2 Phase I: Users’ Flexibility in Terms of Compromising on SQAs

This study is to address the 2nd research question.

RQ2: To what extend flexible users can compromise with service quality attributes of Online Airline Reservation Systems?

4.2.1 Assumptions in ANOVA to Test H₆

Before performing ANOVA, a very basic assumption of ANOVA was checked, i.e. absence of outliers. Box-plot of the sample distribution was examined since it is a useful standard in data interpretation, reveals data symmetry, skewness and the presence of outliers. Moreover, it also facilitates in comparing more than one population without knowing anything about the underlying statistical distributions of those populations.

4.2.1.1 Box-and-Whisker Plot (H₆)

In case of satisfaction level with existing SBTs, respondents who reported that they ‘can compromise’ on SQAs of the airline have a median at 3 (black line) as shown in Figure 4.1.

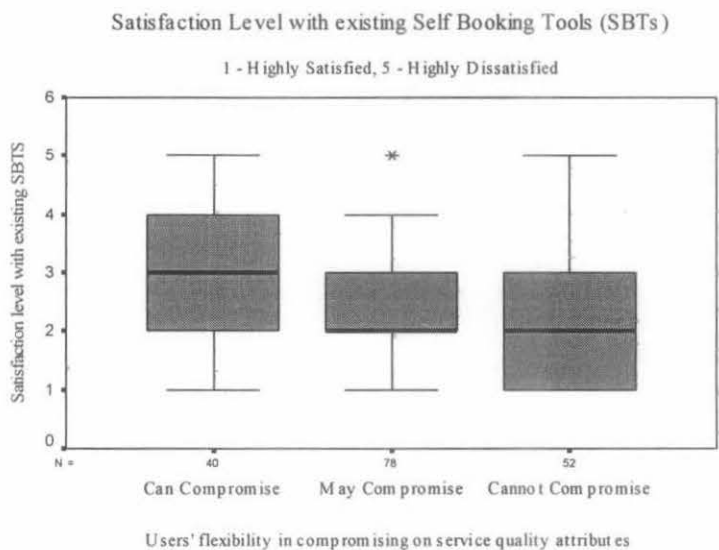


Figure 4.1: Box Plot showing Satisfaction Level with Existing SBTs

This represents neutral satisfaction level and at the same time indicates 50% of the data is greater than this value. Users' with any lesser satisfaction with existing SBTs are represented everything above median black line, while the users with higher satisfaction are represented everything below median black line. As shown by the top 'whisker', this group has greatest values but no outliers. Hence the data is normally distributed.

In case of satisfaction level with existing SBTs, respondents who reported that they 'may compromise' on SQAs of the airline have a median at 2 (black line). This represents high satisfaction level and at the same time indicates 50% of the data is greater than this value. Users' with any lesser satisfaction with existing SBTs are represented everything above median black line, while the users with higher satisfaction are represented everything below median black line. As shown by the top 'whisker', this group has greatest values and an outlier. The majority of the data is normally distributed.

In case of satisfaction level with existing SBTs, respondents who reported that they 'cannot compromise' on SQAs of the airline have a median at 2 (black line). This represents high satisfaction level and at the same time indicates 50% of the data is greater than this value. Users' with any lesser satisfaction with existing SBTs are represented everything above median black line, while the users with higher satisfaction are represented everything below median black line. As shown by the top 'whisker', this group has greatest values but no outliers. Hence the data is normally distributed.

4.2.1.2 Means Plot (H_0)

The means plot as shown in Figure 4.2 shows that there is apparently an enormous difference between the satisfaction level of the three respondents groups, which appears not be the actual case. Therefore as a follow-up, the same results will be analyzed in a different chart to see the difference between the groups.

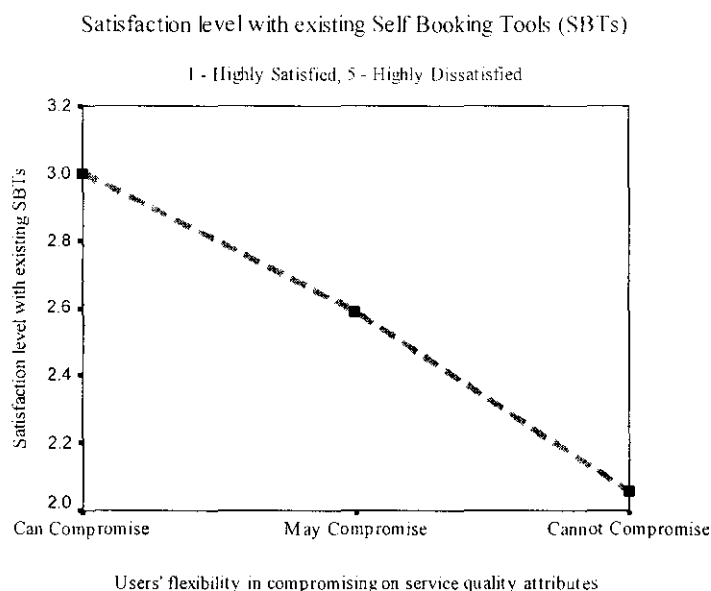


Figure 4.2: Means Plot on Satisfaction Level with Existing SBTs

4.2.1.3 T-Test (H_0)

In this case the three groups are significantly different using a t-test ($t=36.760$, $df=169$, $p=0.000$) as shown in Table 4.3. 95% Confidence Interval (CI) is probability that the interval contains the true mean.

Table 4.3: T-Test on User's Flexibility with SBTs

| | Test Value = 0 | | | | |
|----------------------|----------------|-----|-----------------|-----------------|---|
| | t | df | Sig. (2-tailed) | Mean Difference | 95% Confidence Interval of the Difference |
| How flexible you are | 36.760 | 169 | .000 | 2.07 | Lower 1.96 Upper 2.18 |

4.2.1.4 Error Bars (H_0)

The same results are now reproduced in the error bars, with 95% confidence intervals to have an idea of the variation in sample distribution. CI of the groups is closely related to the results of the analysis of variance for these groups. The confidence interval for each graph below shows a linear pattern of the sample distribution which otherwise appeared to be showing huge variations in the simple means plot.

In error bars we intend to see if the mean of one group is included in the confidence interval of the other two groups - if so then there is likely no difference among the groups. Moreover, it is not relevant whether the error bars 'overlap' but whether the mean of one group 'overlaps' with the error bars of the other. The confidence intervals can overlap by as much as 25 percent of their total length and still show a significant difference between the means for each group.

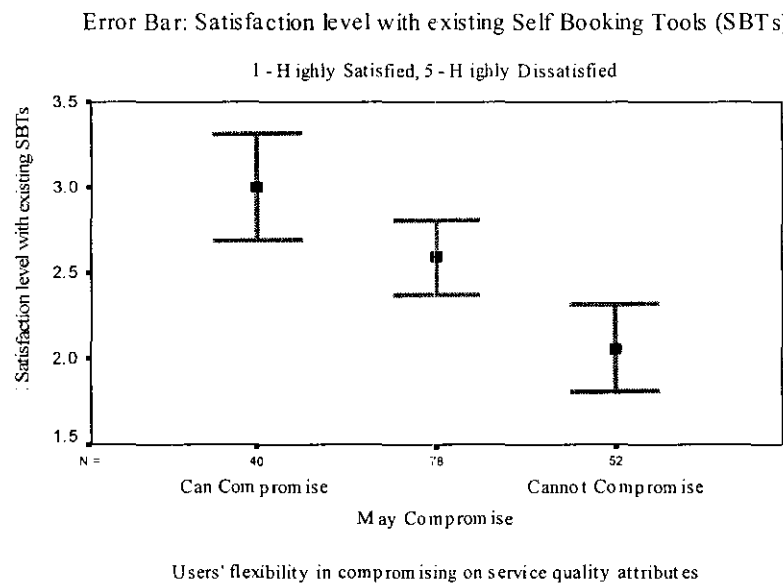


Figure 4.3: Error Bar on Satisfaction Level with Existing SBTs

In Figure 4.3, 95% CI tells us that the satisfaction level of existing SBTs for the users who “can compromise” on SQAs of the airline is probably between 2.7 and 3.35, with group mean of 3. Likewise, for users who “may compromise” it is probably between 2.4 and 2.83, with group mean of 2.6, and for users who “cannot compromise” it is probably between 1.8 and 2.3, with group mean of 2.07.

The group means of users’ who ‘may compromise’ shares a degree of confidence interval overlap with users who ‘can compromise’, thus the two groups may not necessarily be different from one another. Moreover, the group mean of users’ who ‘cannot compromise’ does not share any degree of confidence interval overlap with either of the two groups, therefore, this particular group appears to be significantly different from the rest of the sample population. However, post-hoc tests can confirm this.

4.2.2 Hypothesis Testing H_6

H_6 : The level of satisfaction with existing SBTs is different for respondents with different attitudes towards Users' Flexibility in compromising on SQAs of the airline.

4.2.2.1 One-way Analysis of Variance (H_6)

To test the hypothesis, one-way analysis of variance was used to determine the satisfaction mean of users with the existing self-booking tools of the airline and at the same time report their flexibility level in terms of compromising on SQAs of the airline as shown in Table 4.4.

Table 4.4: One-Way ANOVA on Satisfaction Level with Existing SBTs

| | Sum of Squares | df | Mean Square | F | Sig. |
|-----------------------|----------------|-----|-------------|--------|------|
| Between Groups | 20.707 | 2 | 10.354 | 11.250 | .000 |
| Within Groups | 153.699 | 167 | .920 | | |
| Total | 174.406 | 169 | | | |

The respondents had to select from given three options of, (1) Can compromise on SQAs, (2) May compromise on SQAs, (3) Cannot compromise on SQAs. The analysis showed significant differences among satisfaction mean of the three user groups with existing self booking tools of the airline ($F(2,169) = 11.250, p < .001$).

The respondents who indicated their flexible attitude as “cannot compromise” on SQAs of the airline, depicted highest level of satisfaction with existing SBTs of the airline ($M = 2.06, SD = .916$). This was closely followed by satisfaction of the respondents who indicated their flexible attitude as “may compromise” on SQAs of the airline ($M = 2.59, SD = .973$). The respondents who reported their flexible attitude as “can compromise” on SQAs of the airline, depicted least level of satisfaction with existing SBTs of the airline ($M = 3.00, SD = .987$).

Since the three user groups differed significantly on satisfaction mean level of existing SBTs of the airline, null-hypothesis is rejected and alternative *hypothesis H_6 is accepted*.

4.2.2.2 Post-hoc Scheffe Tests(H_6)

Post-hoc Scheffé tests in Table 4.5 showed that there is a significant difference between the pair of means of the respondents who reported their flexible attitude as “Cannot compromise” on SQAs of the airline with those who “Can compromise”; $p=.000(<.001)$. The same group of respondents also differed significantly from the group of respondents who reported their flexible attitude as “May compromise” on SQAs of the airline, $p=.009 (<.01)$.

Table 4.5: Multiple Comparisons on Satisfaction Level with Existing SBTs

Dependent Variable: Satisfaction with Existing SBTs

| (I) How Flexible You Are | (J) How Flexible You Are | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|--------------------------|--------------------------|-----------------------|------------|------|-------------------------|-------------|
| | | | | | Lower Bound | Upper Bound |
| Can Compromise | May Compromise | .41 | .187 | .092 | -.05 | .87 |
| | Cannot Compromise | .94(*) | .202 | .000 | .44 | 1.44 |
| May Compromise | Can Compromise | -.41 | .187 | .092 | -.87 | .05 |
| | Cannot Compromise | .53(*) | .172 | .009 | .11 | .96 |
| Cannot Compromise | Can Compromise | -.94(*) | .202 | .000 | -1.44 | -.44 |
| | May Compromise | -.53(*) | .172 | .009 | -.96 | -.11 |

* The mean difference is significant at the .05 level.

4.2.2.3 Effect Size for One-way ANOVA(H_6)

From hypothesis testing it is clear that the three groups are different, but this does not confer the strength or the magnitude of this effect. Effect size is measure of the strength of an effect. And since the null-hypothesis has already been rejected, therefore it makes sense to calculate effect-size to determine the size of the effect. The size of the effect is 12% ($\eta^2 = 0.1187$).

4.2.3 Assumptions in ANOVA to Test H_7

Box-plot of the sample distribution was examined to meet the assumption of ANOVA, i.e. absence of outliers. Since it is a useful standard in data interpretation, reveals data symmetry, skewness and the presence of outliers. Moreover, it also facilitates in comparing more than one population without knowing anything about the underlying statistical distributions of those populations.

4.2.3.1 Box-and-Whisker Plot (H_7)

In the case of satisfaction level with existing OTAs, respondents who reported that they 'can compromise' on SQAs of the airline have a median at 2 (black line) as shown in Figure 4.4. This represents high satisfaction level and at the same time indicates 50% of the data is greater than this value. Users' with any lesser satisfaction with existing OTAs are represented everything above median black line, while the users with higher satisfaction are represented everything below median black line. As shown by the top 'whisker', this group has greatest values but no outliers. Hence the data is normally distributed.

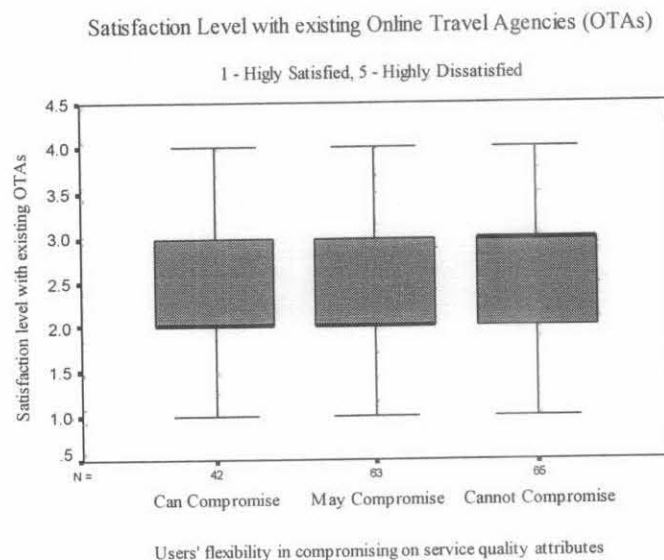


Figure 4.4: Box Plot on Satisfaction Level with Existing OTAs

In the case of satisfaction level with existing OTAs, respondents who reported that they 'may compromise' on SQAs of the airline have a median at 2 (black line). This

represents neutral satisfaction level and at the same time indicates 50% of the data is greater than this value. Users' with any lesser satisfaction with existing OTAs are represented everything above median black line, while the users with higher satisfaction are represented everything below median black line. As shown by the top 'whisker', this group has greatest values but no outliers. Hence the data is normally distributed.

In the case of satisfaction level with existing OTAs, respondents who reported that they 'cannot compromise' on SQAs of the airline have a median at 3 (black line). This represents high satisfaction level and at the same time indicates 50% of the data is greater than this value. Users' with any lesser satisfaction with existing OTAs are represented everything above median black line, while the users with higher satisfaction are represented everything below median black line. As shown by the top 'whisker', this group has greatest values but no outliers. Hence the data is normally distributed.

4.2.3.2 Means Plot (H₇)

The means plot is shown in Figure 4.5.

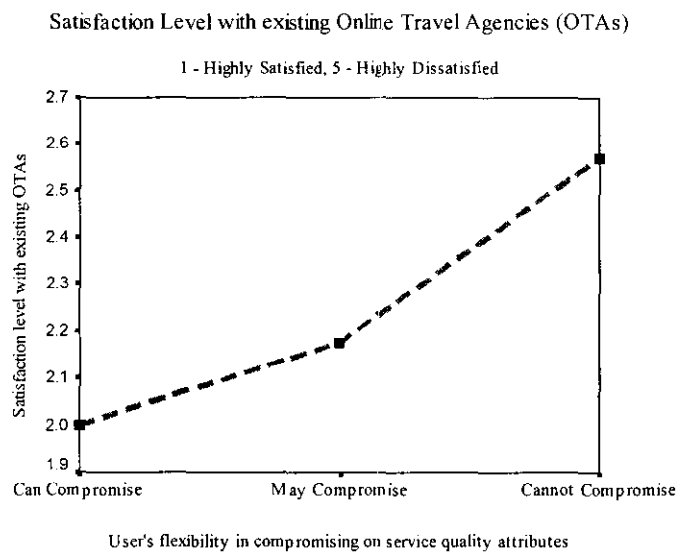


Figure 4.5: Means Plot on Satisfaction Level with Existing OTAs

The means plot shows that their apparently enormous difference between the satisfaction level of the three respondents groups, which may appear not to be actual case. Therefore as a follow-up and to backup this, we will analyze same results in a different chart to see the difference between the groups.

4.2.3.3 T-Test (H_7)

In this case the three groups are significantly different using a t-test ($t = 35.509$, $df = 169$, $p = 0.000$) as shown in Table 4.6. 95% Confidence interval is probability that the interval contains the true mean. CI of the groups is closely related to the results of the analysis of variance for these groups. The confidence interval for each graph below shows a linear pattern of the sample distribution which otherwise appeared to be showing huge variations in the means plot.

Table 4.6: T-Test on User’s Flexibility with Existing OTAs

| Test Value = 0 | | | | | | |
|----------------------|--------|-----|-----------------|-----------------|---|---------------|
| | t | df | Sig. (2-tailed) | Mean Difference | 95% Confidence Interval of the Difference | |
| How flexible you are | 35.509 | 169 | .000 | 2.14 | Lower 2.02 | Upper 2.25 |

4.2.3.4 Error Bars (H_7)

The same results are now reproduced in the error bars as shown in Figure 4.6, with 95% confidence intervals to have an idea of the variation in sample distribution.

In error bars we intend to see if the mean of one group is included in the confidence interval of the other two groups - if so then there is likely no difference among the groups. Moreover, it is not relevant whether the error bars 'overlap' but whether the mean of one group 'overlaps' with the error bars of the other. The confidence intervals can overlap by as much as 25 percent of their total length and still show a significant difference between the means for each group. Any more overlap and the results will not be significant.

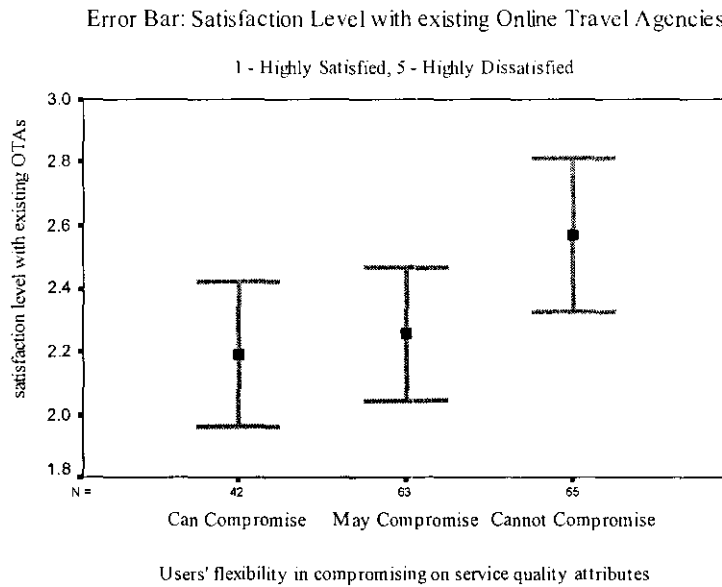


Figure 4.6: Error Bar on Satisfaction Level with Existing OTAs

In Figure 4.6, 95% CI tells us that the satisfaction level of existing OTAs for users who “can compromise” on SQAs of the airline is probably between 1.98 and 2.42, with group mean of 2.2. Likewise, for users who “may compromise” it is probably between 2.03 and 2.44, with group mean of 2.28, and for users who “cannot compromise” it is probably between 2.3 and 2.8, with group mean of 2.6.

The group mean of users’ who ‘can compromise’ shares a certain degree of confidence interval overlap with the error bars for users who ‘may compromise’, thus the two groups may not necessarily be different from one another. Moreover, the group mean of users’ who ‘cannot compromise’ does not share any degree of confidence interval overlap with either of the two groups, therefore, this particular group appears to be significantly different from the rest of the sample population. However, only with our post-hoc tests, this can be confirmed.

4.2.4 Hypothesis Testing H₇

H₇: The level of satisfaction with existing OTAs will be different for respondents with different attitudes towards Users’ Flexibility in compromising on SQAs of the airline.

4.2.4.1 One-way Analysis of Variance (H_7)

To test this hypothesis, one-way analysis of variance was used to determine satisfaction mean of users with existing online travel agencies of the airline and at the same time report their flexibility level in terms of compromising on SQAs of the airline. The respondents had to select from given three options of, (1) Can compromise on SQAs, (2) May compromise on SQAs, (3) Cannot compromise on SQAs as shown in Table 4.7.

The analysis showed significant differences among satisfaction mean of the three user groups with existing online travel agencies ($F(2,169) = 6.728, p = .002 < .01$).

Table 4.7: ANOVA on Satisfaction Level with Existing OTAs

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|-----|-------------|-------|------|
| Between Groups | 9.429 | 2 | 4.715 | 6.728 | .002 |
| Within Groups | 117.018 | 167 | .701 | | |
| Total | 126.447 | 169 | | | |

The respondents who indicated their flexible attitude as “can compromise” on SQAs of the airline, depicted highest level of satisfaction with existing online travel agencies ($M = 2, SD = .625$). This was closely followed by satisfaction of the respondents who indicated their flexible attitude as “may compromise” on SQAs of the airline ($M = 2.17, SD = .794$). The respondents who reported their flexible attitude as “cannot compromise” on SQAs of the airline, depicted least level of satisfaction with existing online travel agencies ($M = 2.57, SD = .984$). Since the three user groups differed significantly on satisfaction mean level of existing online travel agencies, therefore, *hypothesis H_7 is accepted*.

4.2.4.2 Post-hoc Scheffe Tests (H_7)

Post-hoc Scheffé tests in Table 4.8 showed that there is a significant difference between the pair of means of the respondents who reported their flexible attitude as “Cannot compromise” on SQAs of the airline with those who “Can compromise”; $p = .000 (< .001)$. The same group of respondents also differed significantly from the

group of respondents who reported their flexible attitude as “May compromise” on SQAs of the airline, $p=.031 (< .05)$.

Table 4.8: Multiple Comparisons on Satisfaction Level with Existing OTAs

Dependent Variable: Satisfaction with Existing OTAs

| (I) how flexible you are | (J) how flexible you are | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|--------------------------|--------------------------|-----------------------|------------|------|-------------------------|-------------|
| | | | | | Lower Bound | Upper Bound |
| Can Compromise | May Compromise | -.17 | .167 | .579 | -.59 | .24 |
| | Cannot Compromise | -.57(*) | .166 | .003 | -.98 | -.16 |
| May Compromise | Can Compromise | .17 | .167 | .579 | -.24 | .59 |
| | Cannot Compromise | -.39(*) | .148 | .031 | -.76 | -.03 |
| Cannot Compromise | Can Compromise | .57(*) | .166 | .003 | .16 | .98 |
| | May Compromise | .39(*) | .148 | .031 | .03 | .76 |

* The mean difference is significant at the .05 level.

4.2.4.3 Effect Size for One-way ANOVA

From our hypothesis testing we know that the three groups are different, but this does not confer the strength or the magnitude of this effect. Effect size is measure of the strength of an effect. And since we have already rejected the null-hypothesis in the both of the above cases, therefore it makes sense to calculate effect-size to determine the size of the effect. The size of the effect is 7.5% ($\eta^2 = 0.0745$).

4.3 Phase I: Users’ Satisfaction with SBTs against their rated OTA Feature

This study is to address the 3rd research question.

RQ3: How users’ satisfaction with existing SBTs of airlines is rated against their choice of OTA feature and reflected in their integration assessment of the same for making SBTs more FOARS?

4.3.1 Hypothesis Testing H₈

H₈: Users’ satisfaction with existing SBTs will be different across their choice of four OTA features for making SBTs more FOARS.

4.3.1.1 Means Plot

The means plot as shown in Figure 4.7 illustrates two lines, red line indicating respondents who consider integration of OTA features into SBTs may not necessarily make them FOARS, while the green one denotes the respondents who think otherwise. Means plot showed that out of the four OTA features investigated in this study, user satisfaction was highest for opaque fare and hotel search facility. Among the two, opaque fare was highly recommended due to being users’ absolute satisfaction point.

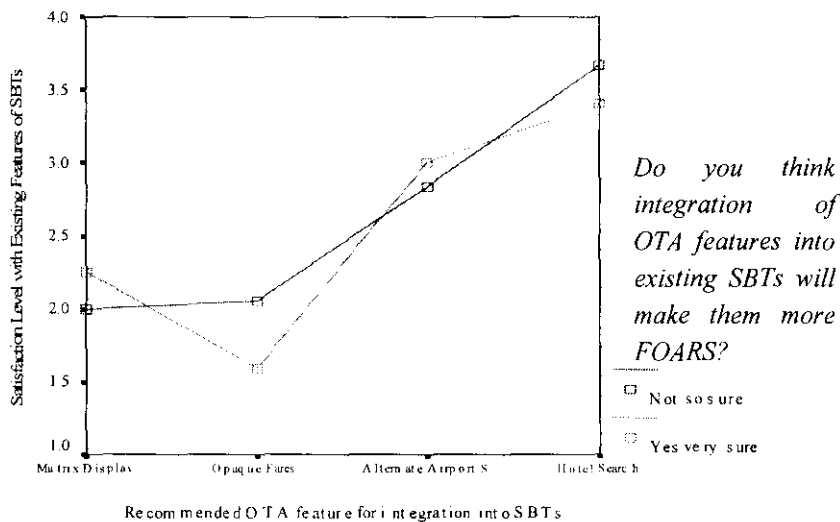


Figure 4.7: Means Plot on the Recommendation of Integrating OTA Features

Out of the four OTA features investigated in this study, opaque fare and hotel search are the only two OTA features for which the green line is lower than the red line (low value indicates high satisfaction). However, among the two, opaque fare is the most recommended OTA feature for making SBTs flexible, since it reflects absolute highest satisfaction point of the respondents, who thought integration of OTA features into SBTs will make them more FOARS and also among respondents who think otherwise, because it has been considered as the second most important feature for integration, only after Matrix Display.

Table 4.9: Mean Score and SD on the Recommendation of Integrating OTA Features

| | | | Matrix Display | Opaque Fares | Alternative Airport Search | Hotel Search Facility |
|--|----------------------------------|--------------|---------------------------|-------------------------|---|--------------------------------------|
| <i>Do you think integration of OTA features in to existing SBTs will make them more FOARS?</i> | Yes, very sure about it. | Mean | 2.25 | 1.60 | 3.00 | 3.40 |
| | | S. D. | .500 | .548 | .707 | .548 |
| | Not so very sure about it. | Mean | 2.00 | 2.06 | 2.83 | 3.67 |
| | | S. D. | .707 | .827 | .753 | .577 |

4.3.1.2 Two-ways Analysis of Variance

A two-way analysis of variance tested the satisfaction level of the representatives with existing OARS and also reported if the integration of OTA features into SBTs would make them more FOARS, and also picked their recommended OTA feature for integration into SBTs. The three different F-tests as shown in Table 4.10 are:

1. The first one is the mean satisfaction level different across four proposed OTA features for SBTs, controlling for that effect of sharing, if the chosen OTA feature will make existing SBTs more flexible. The difference in satisfaction level has been found to be statistically significant at $p<0.01$.
2. The second F-test looks at whether respondents who reported that integration of OTA features into SBTs will make them flexible reservation systems, do or do not have different levels of satisfaction with existing OARS, and again the results were significant at $p<0.05$
3. The third F-test examines the interaction effect of the four proposed OTA features and their integration into SBTs for making them FOARS. The finding was significant at $p<0.05$, suggesting that some combination of OTA features and existing SBTs are related and can influence upon one another, especially in terms of making them more flexible.

Table 4.10: Two-way ANOVA on the Satisfaction Level with Existing OARSs

| Dependent Variable: Satisfaction Level with Existing OARS (SBTs) | | | | | |
|--|-------------------------|----|-------------|---------|------|
| Source | Type III Sum of Squares | df | Mean Square | F | Sig. |
| Corrected Model | 18.729(a) | 7 | 2.676 | 5.205 | .000 |
| Intercept | 269.145 | 1 | 269.145 | 523.552 | .000 |
| Recommended OTA feature for SBTs | 18.056 | 3 | 6.019 | 11.708 | .000 |
| Flexible SBTs (Yes/No) | 1.827 | 1 | 1.827 | 3.556 | .004 |
| Flexible SBTs * Recommended OTA feature for SBTs | 1.012 | 3 | .337 | .656 | .042 |
| Error | 21.591 | 42 | .514 | | |
| Total | 338.000 | 50 | | | |
| Corrected Total | 40.320 | 49 | | | |
| a. R Squared = .465 (Adjusted R Squared = .375) | | | | | |

The three different F-tests in the two way analysis of variance are discussed as under:

1. Respondents, who indicated that integration of OTA's feature into existing SBTs will make them FOARS, shared the highest level of satisfaction when opted for opaque fare as a recommended OTA feature for SBTs. However, respondents who indicated integration of OTA features into existing SBTs may not make them flexible, reported higher level of satisfaction when opted for Matrix Display and Alternate Airport Search as a recommend solution for SBTs ($F = 11.708, p = .000 < 0.01$).
2. Satisfaction level with existing OARS differed significantly ($F = 3.556, p = .004 < 0.05$) across respondents who indicated whether or not integration of OTA features would make the existing systems more flexible.
3. The interaction effect of the four proposed OTA features and their integration into SBTs for making them FOARS was also significant ($F = .656, p = .042 < 0.05$).

F-Test for respondents, who indicated that integration of OTA's feature into existing SBTs will make them flexible Online Airline Reservation Systems, shared the highest level of satisfaction when opted for opaque fare as a recommended OTA feature for SBTs ($F = 11.708, p = .000 < 0.01$). Since the satisfaction level of the users differed significantly, therefore, *hypothesis is accepted*.

4.4 Phase II: Users’ Perception on Flexible Traveling Behavior

This study is to address the 4th research question.

RQ4: How users’ perception on factors influencing flexible traveling behavior and FOARS is determined?

4.4.1 Qualitative Analysis

The demographics of the 14 respondents from travelblog forum and 17 from travellerspoint forum are shown in Table 4.11. The average ages of the 14 male and female respondents in case of Travelblog forum were recorded 37 and 35, respectively. Likewise, the average ages of the 17 male and female respondents in case of Travellerspoint forum were recorded 41 and 37, respectively.

Table 4.11: Demographics of Online Travel Forums (OTF) Respondents

| | Travelblog (14) | Travellerspoint (17) |
|---|---|--|
| Male | 9 | 10 |
| Female | 5 | 7 |
| Average Age (Male) | 37 | 41 |
| Average Age (Female) | 35 | 37 |
| Countries of Origin | USA, China, Singapore, UK, Kenya, India, Peru, Indonesia, Spain, Thailand, Nepal, Romania, Canada, South Africa | USA, Japan, Malaysia, China, Singapore, Thailand, Australia, Indonesia |
| Rejected cases of ambiguous respondents | 5 | 7 |

The responses received through online discussion forums were analyzed first as shown in Table 4.12 in order to investigate the factors influencing on users’ flexible traveling behavior and factors influencing upon users perception of a flexible online airline reservation system.

Table 4.12: Results of Online Travel Forums

| Reasons/Factors | |
|---|--|
| Which factors influence on users' flexible traveling behavior? | <ul style="list-style-type: none">▪ Promotional packages offered by a particular airline▪ Searching skills to look for best offers and deals online▪ Budgetary constraints and leverages▪ Traveling comfort in services offered▪ Traveling purpose▪ Flying frequency▪ Family and friends |
| Which factors influence upon your perception of a flexible online reservation system? | <ul style="list-style-type: none">▪ Simplicity▪ Easiness▪ Multiple options |

After data analysis of online travel forum discussion, the semi structured in-depth interviews were conducted; the demographics are summarized in Table 4.13.

Table 4.13: Demographics of In-depth (ID) Interview

| No. of respondents (as per same Country of Origin) | Country of Origin | Gender | Age (Avg.) | Flying Frequency / Year (Avg.) | Purchase Experience with SBTs of Airline | Purchase Experience with any popular OTA |
|--|-------------------|--------|------------|--------------------------------|---|--|
| 6 | Malaysia | Male | 4 | 34 | Frequent (Twice a year) | Yes |
| | | Female | 2 | 30 | | |
| 4 | USA | Male | 2 | 40 | Very Frequent (more than twice a year) | Yes |
| | | Female | 2 | 37 | | |
| 3 | UK | Male | 2 | 29 | Very Frequent (more than twice a year) | Yes |
| | | Female | 1 | 26 | | |
| 2 | China | Male | 1 | 36 | Very Frequent (more than twice a year) | Yes |
| | | Female | 1 | 24 | | |
| 2 | India | Male | 2 | 33 | Frequent (Twice a year) | Yes |
| | | Female | 0 | - | | |
| 2 | Pakistan | Male | 2 | 43 | Frequent (Twice a year) | Yes |
| | | Female | 0 | - | | |
| 2 | Singapore | Male | 0 | - | Very Frequent (more than twice a year) | Yes |
| | | Female | 2 | 27 | | |
| 2 | Ireland | Male | 1 | 25 | Frequent (Twice a year) | Yes |
| | | Female | 1 | 20 | | |
| 2 | Thailand | Male | 1 | 31 | Frequent (Twice a year) | Yes |
| | | Female | 1 | 29 | | |
| 1 | Australia | Male | 1 | 44 | Very Frequent (more than twice a year) | Yes |
| | | Female | 0 | - | | |
| 1 | Sudan | Male | 1 | 35 | Not Very Frequent (Once a year) | Yes |
| | | Female | 0 | - | | |
| 1 | Mauritius | Male | 1 | 29 | Frequent (Twice a year) | Yes |
| | | Female | 0 | - | | |

The responses received through in-depth interviews were analyzed in the second phase. Table 4.14 provides additional information on users’ flexible traveling behavior.

Table 4.14: Results of In-depth Interviews

| Reasons | |
|---|---|
| Which factors influence on users’ flexible traveling behavior? | <ul style="list-style-type: none">▪ Airlines reput▪ Standard conscious▪ Promotional packages offered by a particular airline▪ Searching skills to look for best offers and holiday deals▪ Customer loyalty▪ Traveling comfort in services offered▪ Supporter of Green Environment▪ Patriotism▪ Traveling purpose▪ Flying frequency▪ Budgetary constraints and leverages▪ Occupation▪ Children holidays▪ Traveling mileage▪ Interest in recreation, leisure, and tourism |
| Which factors influence upon your perception of a flexible online reservation system? | <ul style="list-style-type: none">▪ Provides alternative dates for flying▪ Allows self-adjustments in itinerary▪ Simplicity▪ Easiness▪ Multi-linguistic |

After data analysis of semi structured in-depth interview, focus group interviews were conducted, the demographics are shown in Table 4.15.

Table 4.15: Demographics of Focus Group (FG) Interviews

| Meeting With Independent Airline Reservation Offices | | | |
|--|----------------|-------------------------------|--------------------------|
| Airlines | No. of Manager | No. of Executives interviewed | No. of Technical Experts |
| Malaysian Airline | 1 | 2 | 1 |
| Fire Fly | 1 | 2 | 1 |
| Aero Asia | 1 | 1 | 1 |

Table 4.16: Results of Focus Group

| | Reasons |
|---|--|
| Which factors influence on users' flexible traveling behavior? | <ul style="list-style-type: none"> ▪ Peak / off travel time ▪ Discounted versus Normal Fare ▪ Traveling mileage ▪ Traveling purpose ▪ Working hours ▪ Traveling comfort in services offered ▪ Children holidays ▪ Recreation, leisure, and tourism ▪ Promotional Schemes ▪ Airlines reputa |
| Which factors influence upon your perception of a flexible online reservation system? | <ul style="list-style-type: none"> ▪ Easiness ▪ Product presentation ▪ Post sale features ▪ User prompting for their guidance throughout reservation process ▪ Matrix display to sort airfares on different dates and destinations ▪ Low fare notifications ▪ Flexible and alternative date search ▪ Dynamic packaging ▪ Hotel search display, sort and reservation |

The following 6 themes emerged under factors influencing upon flexible traveling behavior and 3 themes emerged under factors influencing upon perceived flexibility of a reservation system after giving much thought process to results, reviewing literature, discussion with qualitative researchers:

- **Theme 1:** Travelers' Flexible Behavior is molded by their traveling consciousness.
- **Theme 2:** Travelers' Flexible Behavior is molded by their belief that they have the required digital skills.
- **Theme 3:** Travelers' Flexible Behavior is molded by their self-belief as flexible travelers.
- **Theme 4:** Travelers' Flexible Behavior is molded by societal influences.
- **Theme 5:** Travelers' Flexible Behavior is molded by how they attribute a cause to their traveling behavior.
- **Theme 6:** Travelers' Flexible Behavior is molded by their prior traveling experiences.

- **Theme 7:** Systems Perceived Flexibility is influenced by its perceived usability.
- **Theme 8:** Systems Perceived Flexibility is influenced by end-user support.
- **Theme 9:** Systems Perceived Flexibility is influenced by comparison of features on the actual level of effect regarding to complete the reservation process.

4.5 Phase II: Classification of Users on the Basis of Their Flexible Traveling Behavior

This study is to address the 5th research question.

RQ5: How to classify Users’ on the basis of their Flexible Traveling Behavior into High, Medium and Low flexible and how to investigate interrelationships among System’s Flexibility, Users’ Flexibility and Perceived Usability of existing OARS?

4.5.1 Hypotheses Testing H₉

H₉: Users can be classified on the basis of their flexible traveling behavior.

Users’ Flexibility Transforming Scale – The transforming scoring scale was accordingly adapted in this study as discussed in Chapter 3 to meet the requirements of item discrimination. The same results in adapted table are shown in Table 4.17.

Table 4.17: Users’ Flexibility Transforming Scoring Scale

| Users’ Flexibility Rating on Service Quality Attributes of Airlines | Highest | High | Neutral | Low | Least |
|---|---------|------|---------|-----|-------|
| Scale | 1 | 2 | 3 | 4 | 5 |
| Users’ Rating Frequency | -2 | -1 | 0 | +1 | +2 |
| Product (Users’ Rating Frequency * Scale) | 1 | 1 | 4 | 3 | 1 |
| Users’ Flexibility Score (UFS) | -2 | -1 | 0 | 3 | 2 |

The participants scoring on Section 2 of the questionnaire (Appendix D) was transformed using Table 4.17, in order to obtain their unique Users’ Flexibility Score. In total, ninety (90) Users’ Flexibility Score was recorded and transformed, of which

after extensive filtration of results, 62 cases were retained of those Users’ only who had adequately respondents in all 4 sections of the questionnaire.

Range: From our sample data set, the range to classify respondents on the basis of their Users’ Flexibility Score is 2 ~ +19 as shown in Table 4.18. This range has 18 digits in between inclusive of the extreme two ends. So if we divide this range approximately among three groups, we get the following classifications to be assigned to users on the basis of their flexibility score.

Table 4.18: Range for Classification of Users’ Flexible Behavior on the basis of their unique Users’ Flexibility Score (UFS)

| | Classification | Range |
|---|--------------------------|--------------|
| 1 | Low Flexible Behavior | + 02 to + 07 |
| 2 | Medium Flexible Behavior | + 08 to + 13 |
| 3 | High Flexible Behavior | + 14 to + 19 |

Based on classification range identified from data distribution and transformation scale adapted from literature users’ classifications were made as with High, Medium and Low flexible behavior on the basis of Users’ Flexibility Score. Users’ with High Flexible Behavior were assigned code 3, Medium Flexible Behavior were assigned code 2, and Low Flexible Behavior were assigned code 1 (Appendix E). Figure 4.8 shows the classification of users on the basis of their Users’ Flexibility Scores.

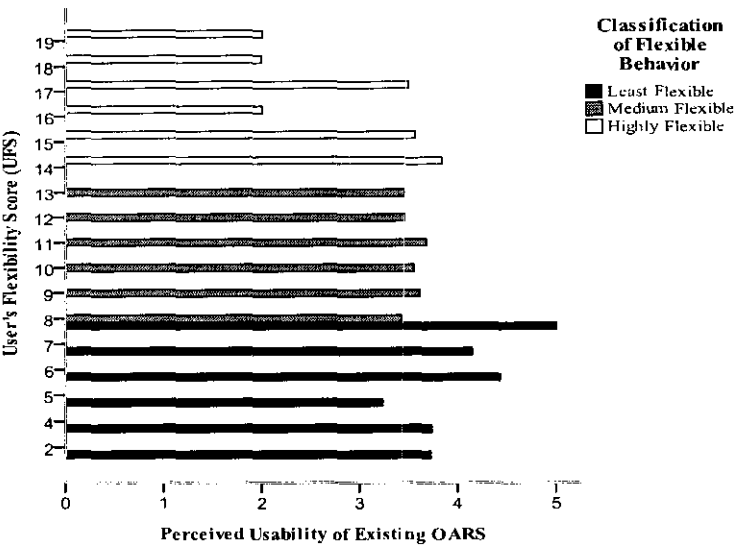


Figure 4.8: Data Distribution after Classifications of Users’

Users’ with high (denoted by white line), medium (denoted by green) and low (denoted by black) flexibility in their traveling behavior have different levels of satisfaction. Users with high, medium and low Users’ Flexibility Score have different level of Perceived Usability and therefore the hypothesis H_9 is accepted.

4.5.2 Hypotheses Testing H_{10}

H_{10} : User’s Flexible Behavior and their Perceived Usability is correlated.

The interrelationship between Users’ Flexible Behavior and their Perceived Usability of FOARS is shown in Table 4.19.

Table 4.19: Interrelationship between UFB and their Perceived Usability of FOARS

| Kendall's Tau b | | UFB | PU |
|-----------------------------------|-------------------------|---------|---------|
| Users’ Flexible Behavior (UFB) | Correlation Coefficient | 1.000 | .381(*) |
| | Sig. (2-tailed) | . | .049 |
| | N | 62 | 62 |
| Perceived Usability of FOARS (PU) | Correlation Coefficient | .381(*) | 1.000 |
| | Sig. (2-tailed) | .049 | . |
| | N | 62 | 62 |

* Correlation is significant at the 0.05 level (2-tailed)

Negative Association – Users’ Flexible Behavior (UFB) is positively associated with Perceived Usability of FOARS, correlation coefficient $r = 0.381$, is significant at $p < 0.05$. This means that as one variable increases in value, the second variable also increases in value. This is called a positive correlation. The significance value indicates that the relationship is genuine, hence H_{10} is confirmed.

4.5.3 Hypotheses Testing H_{11}

H_{11} : User’s Flexible Behavior and System’s Flexibility is correlated.

In order to investigate the interrelationship between Users’ Flexible Behavior and System’s Flexibility, Pearson’s Correlation Coefficients was calculated. Table 4.20 provides a matrix of correlation coefficients for the five variables, (1) Users’ Flexible Behavior, (2) System’s Flexibility, (3) System’s Adaptability, (4) Systems’

Adaptivity, (5) Systems' Personalization. It also displays a matrix of significance values for these coefficients.

- Users' Flexible Behavior share a statistically non-significant relationship with System's Flexibility, $r = 0.255$, $p = 0.056 > 0.05$.
- Users' Flexible Behavior share a statistically significant relationship with System's Adaptability, $r = 0.372$, $p = 0.000 < 0.001$.
- Users' Flexible Behavior share a statistically non-significant relationship with System's Adaptivity, $r = 0.151$, $p = 0.146 > 0.05$.
- Users' Flexible Behavior share a statistically significant relationship with System's Personalization, $r = 0.314$, $p = 0.042 < 0.05$.
- System's Flexibility share a statistically significant relationship with System's Adaptability, $r = 0.560$, $p = 0.000 < 0.001$.
- System's Flexibility share a statistically significant relationship with System's Adaptivity, $r = 0.344$, $p = 0.045 < 0.05$.
- System's Flexibility share a statistically significant relationship with System's Personalization, $r = 0.222$, $p = 0.032 < 0.05$.
- System's Adaptability share a statistically significant relationship with System's Adaptivity, $r = 0.342$, $p = 0.000 < 0.001$.
- System's Adaptability share a statistically significant relationship with System's Personalization, $r = 0.326$, $p = 0.016 < 0.05$.
- System's Adaptivity share a statistically non-significant relationship with System's Personalization, $r = 0.153$, $p = 0.074 > 0.05$.

The results showed that users' FTB to have a non-significant correlation with System's Flexibility ($r = 0.255$, $p = 0.056 > 0.05$). Likewise, Adaptivity (sub-variables of System's Flexibility) also shared a non-significant correlation with users' FTB ($r = 0.151$, $p = 0.146 > 0.05$). However, Adaptability (a sub-variable of System's Flexibility) shared a strong positive and significant correlation with users' FTB ($r = 0.372$, $p = 0.000 < 0.001$). When the same results were interpreted using r^2 , Adaptability accounted for 26% of the variability in users' FTB.

Table 4.20: Pearson Coefficient Correlations to Investigate the Interrelationship between UFB and System’s Flexibility

| | | Users’ Flexible Behavior | System’s Flexibility | System’s Adaptability | System’s Adaptivity | System’s Personalization |
|---------------------|--------------------------|---------------------------------|-----------------------------|------------------------------|----------------------------|---------------------------------|
| Pearson Correlation | Users’ Flexible Behavior | 1 | 0.255 | 0.372** | 0.151 | 0.314* |
| | System’s Flexibility | 0.255 | 1 | 0.560** | 0.344 | 0.222 |
| | System’s Adaptability | 0.306** | 0.560** | 1 | 0.342** | 0.326* |
| | System’s Adaptivity | 0.151 | 0.344 | 0.342** | 1 | 0.153 |
| | System’s Personalization | 0.177* | 0.222 | 0.326* | 0.153 | 1 |
| Sig. (2-tailed) | Users’ Flexible Behavior | - | 0.056 | 0.000 | .146 | 0.042 |
| | System’s Flexibility | 0.056 | - | 0.000 | 0.045 | 0.222 |
| | System’s Adaptability | 0.000 | 0.000 | - | 0.000 | 0.016 |
| | System’s Adaptivity | .146 | 0.045 | 0.000 | - | 0.074 |
| | System’s Personalization | 0.042 | 0.222 | 0.016 | 0.074 | - |
| N | Users’ Flexible Behavior | 61 | 61 | 61 | 61 | 61 |
| | System’s Flexibility | 61 | 61 | 61 | 61 | 61 |
| | System’s Adaptability | 61 | 61 | 61 | 61 | 61 |
| | System’s Adaptivity | 61 | 61 | 61 | 61 | 61 |
| | System’s Personalization | 61 | 61 | 61 | 61 | 61 |

The overall relationship between UFB and SF shows non-significant values. However, there are significant relationships between UFB and the two components of the SF i.e. System's Adaptability and System's Personalization. Therefore, the hypothesis H_{11} is *partially accepted*.

4.5.4 Hypotheses Testing H_{12}

H_{12} : Perceived Usability of OARS is not affected by users' flexible behavior after adjusting for the effect of the covariate, System's Flexibility.

4.5.4.1 One-way Analysis of Variance (H_{12})

To meet the assumption of ANCOVA i.e. Independence of the covariate and treatment effect – one way independent ANOVA was performed on Perceived Usability as independent variable and covariate System's Flexibility as an outcome variable as shown in Table 4.21. This analysis should be non-significant to meet the assumption and result showed non-significant effect of Perceived Usability of FOARS on System's Flexibility.

Table 4.21: One Way Independent ANOVA with PU and System's Flexibility

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|-------|------|
| Between Groups | 39.616 | 4 | 9.904 | 2.476 | .261 |
| Within Groups | 6.372 | 56 | 0.1138 | | |
| Total | 45.988 | 60 | | | |

Sum of squares between groups for the corrected model is 6.093, which indicates total experimental effect while means square of the model is 3.047, which represents average experimental effect as shown in Table 4.22. Unexplained variance error is the sum of squares within groups; it is 8.128 and explains unsystematic variation within data. The test of whether the group means are the same is represented by the F-ratio for the combined between group effect. The value of F ratio is 22.114, which is significant with $p = .000 < 0.001$. It is therefore reported after conducting ANOVA that there was a significant effect of Users' Flexible Behavior on their Perceived Usability of FOARS, $F(2, 59) = 22.114, p = 0.000 < 0.001$.

Table 4.22: ANOVA with PU and System's Flexibility

Dependent Variable: Perceived Usability of FOARS

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. |
|--------------------------|-------------------------|----|-------------|----------|------|
| Corrected Model | 6.093(a) | 2 | 3.047 | 22.114 | .000 |
| Intercept | 584.054 | 1 | 584.054 | 4239.555 | .000 |
| Users' Flexible Behavior | 6.093 | 2 | 3.047 | 22.114 | .000 |
| Error | 8.128 | 59 | .138 | | |
| Total | 894.345 | 62 | | | |
| Corrected Total | 14.221 | 61 | | | |

a. R Squared = .428 (Adjusted R Squared = .409)

4.5.4.2 Analysis of Covariance (H_{12})

ANOVA results indicated that an important assumption of ANCOVA has not been violated. Therefore, ANCOVA was performed to first examine influence of independent or fixed factor (Users' Flexible Behavior) on dependent variable (Perceived Usability of FOARS) and then experiment was manipulated by introducing a covariate (System's Flexibility) as shown in Table 4.23.

Table 4.23: ANCOVA by Introducing System's Flexibility as Covariate

Dependent Variable: Perceived Usability of FOARS

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. |
|--------------------------|-------------------------|----|-------------|--------|------|
| Corrected Model | 6.487(a) | 3 | 2.162 | 16.215 | .000 |
| Intercept | 8.400 | 1 | 8.400 | 62.992 | .000 |
| Users' Flexible Behavior | .394 | 1 | .394 | 2.952 | .047 |
| System's Flexibility | 3.852 | 2 | 1.926 | 14.443 | .000 |
| Error | 7.734 | 58 | .133 | | |
| Total | 894.345 | 62 | | | |
| Corrected Total | 14.221 | 61 | | | |

a. R Squared = .456 (Adjusted R Squared = .428)

Looking first at the significance value, it clear that covariate, i.e., System's Flexibility, significantly predicts Perceived Usability of FOARS at $F(1, 58) = 2.952$, $p = 0.47 < 0.05$. What is more interesting is that when the effect of System's Flexibility is added, the effect of Users' Flexible Behavior still remains significant ($p = 0.000 < .001$) towards predicting Perceived Usability of FOARS. The amount of variation accounted for by the model has increased to 6.487 units for the corrected model, of which System's Flexibility now accounts for 3.9 units. Most important, the amount of

variation or unexplained variance in Perceived Usability of FOARS that is accounted for by the covariate has reduced to 7.7 units from 8.1 units.

4.6 Phase III: Users’ Flexibility is determined by SQAs and EVs

This study is to address the 6th research question.

RQ6: How do Service Quality Attributes of airlines and External Variables jointly predict flexible behavior of travelers?

4.6.1 Hypothesis Testing H₁₃

H₁₃: Flexible behavior of travelers cannot be predicted by Service Quality Attributes and External Variables.

4.6.1.1 Scatter Plots (H₁₃)

To examine whether linear regression is appropriate, scatter plots as shown in Figure 4.9 and Figure 4.10 were examined of each independent variable against the predicting or the dependent variable. User’s Flexibility were treated as dependent variable, SQAs and External Variables were treated as independent variable with N = 250.

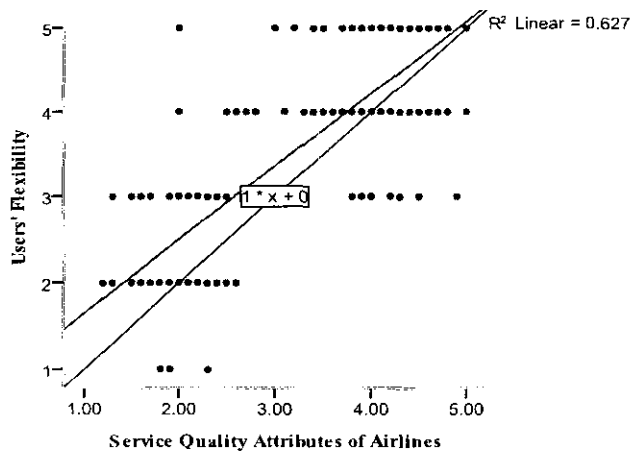


Figure 4.9: Scatter Plot between Users’ Flexibility and SQAs

The first scatter plot examines SQAs of the airline against users' flexible personality. Each of the points on scatter plot represents a particular observation from the data. The data appears to be normally distributed along with linear regression line and has no obvious outliers. A general trend or relationship between the two variables is also predictable.

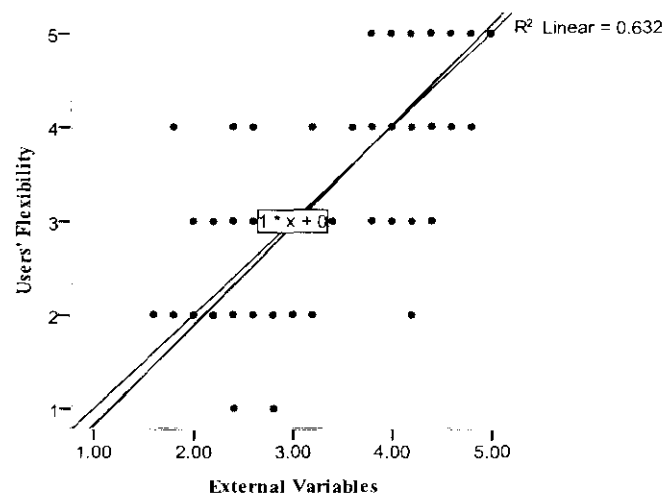


Figure 4.10: Scatter Plot between Users' Flexibility and External Variables

The second scatter plot examines external variables against users' flexible personality. The data appears to be normally distributed along with linear regression line and has no obvious outliers. A general trend or relationship between the two variables is also predictable.

4.6.1.2 *Pearson Correlation Coefficients (H₁₃)*

Correlation of the two independent variables was also computed to determine their association with Users' Flexibility and to further ascertain their individual range and strength of association (see Table 4.24). SQAs share a strong positive correlation with Users' Flexibility, $r = .792$, highly significant at $p < 0.001$. Likewise, External Variables also share a strong positive correlation with Users' Flexibility, $r = .795$, highly significant at $p < 0.001$ level.

Table 4.24: Correlations between Flexible Personality, SQA and External Variables

| | | Personality in terms of Flexibility? | SQA | External Variables |
|--|---------------------|---|--------|-----------------------|
| How do you rate your overall personality in terms of flexibility? | Pearson Correlation | 1 | .792** | .795** |
| | Sig. (2-tailed) | | .000 | .000 |
| | N | 250 | 250 | 250 |
| SQA | Pearson Correlation | .792** | 1 | .881** |
| | Sig. (2-tailed) | .000 | | .000 |
| | N | 250 | 250 | 250 |
| External Variables | Pearson Correlation | .795** | .881** | 1 |
| | Sig. (2-tailed) | .000 | .000 | |
| | N | 250 | 250 | 250 |

** . Correlation is significant at the 0.01 level (2-tailed).

4.6.1.3 Multiple Regression Analysis (H_{13})

The value of Multiple Correlation Coefficient (R) between the two independent variables and Users' Flexibility is 0.818 as shown in Table 4.25. The maximum value of multiple correlation coefficients is 1, positive or negative and indicates correlation of all variables for predicting one single outcome, which in this case is 0.818, suggesting a strong relationship of the two independent variables with UF.

Table 4.25: Multiple Correlation Analysis between EV, SQA and Users' Flexibility

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|-------------------------------|
| 1 | .818 ^a | .669 | .667 | .653 |

a. Predictors: (Constant), External Variables (EV), SQA

4.6.1.4 Analysis of Variance (H_{13})

Analysis of Variance tests whether the model is significantly better at predicting the outcome, than using the mean as a best guess. In this analysis, simultaneous test was performed as shown in Table 4.26 to examine, (i) if all of the coefficient values could be zero, and (ii) if they are all able to be zero that would mean that none of the independent variables have a relationship with the dependent variable (null hypothesis). And if null hypothesis is not rejected, it means the model is not useful, as none of the independent variables have a relationship with the dependent variable.

In alternative hypothesis, may be at least one of the independent variable's relationship with dependent variable will not be zero, indicating at least one of the coefficients values is not zero. This model has an F ratio = 250.121 which is highly significant at $p < .001$. This means that model significantly improves ability to determine users' flexible behavior; therefore, *null hypothesis is rejected* as at least one of the coefficient values is not zero.

Table 4.26: ANOVA with External Variables and SQAs

| Model | Sum of Squares | df | Mean Square | F | Sig. |
|------------|----------------|-----|-------------|---------|-------------------|
| Regression | 213.499 | 2 | 106.749 | 250.121 | .000 ^a |
| Residual | 105.417 | 247 | .427 | | |
| Total | 318.916 | 249 | | | |

a. Predictors: (Constant), External Variables, SQAs

4.6.1.5 Testing and Interpreting Model Coefficients (H_{13})

Table 4.27 shows values of coefficients and t-tests.

Table 4.27: Values of Coefficients and T-test

| Model | Un-standardized Coefficients | | Standardized Coefficients | t | Sig. |
|--|------------------------------|------------|---------------------------|--------|------|
| | B | Std. Error | Beta | | |
| 1 (Constant) | .119 | .240 | | .497 | .620 |
| SQAs (Flying Date Confirmation) | .011 | .076 | .012 | .143 | .886 |
| SQAs (Flying Carrier Confirmation) | .073 | .079 | .074 | .930 | .353 |
| SQAs (Flying Time Confirmation) | -.076 | .072 | -.091 | -1.066 | .288 |
| SQAs (No. of Stop Over). | .017 | .071 | .018 | .234 | .815 |
| SQAs (No. of connected flights) | .043 | .080 | .042 | .534 | .594 |
| SQAs (Ticket Class) | .096 | .064 | .099 | 1.505 | .134 |
| SQAs (Seat Specification) | .003 | .068 | .003 | .046 | .964 |
| SQAs (Last minute discounts) | .120 | .066 | .128 | 1.829 | .043 |
| SQAs (Confirmation of Origin and Destination Airport) | .095 | .061 | .113 | 1.572 | .017 |
| SQAs (Immediate Confirmation of Itinerary on purchase) | .106 | .069 | .119 | 1.542 | .003 |
| Attribution | .073 | .067 | .074 | 1.099 | .273 |
| Engagement | .171 | .067 | .166 | 2.548 | .011 |
| Persuasion | .071 | .053 | .264 | 1.335 | .018 |
| Identity | .108 | .066 | .125 | 1.638 | .037 |
| Self Efficacy | .090 | .056 | .070 | 1.619 | .107 |

a. Dependent Variable: How do you rate your overall personality in terms of flexibility?

4.7 Phase III: Perceived Usability with Existing and Proposed Systems

This study is to address the 7th research question.

RQ7: How does user Perceived Usability with the existing and the proposed system differs?

4.7.1 Hypothesis Testing H₁₄

H₁₄: User Perceived Usability with existing and proposed systems is different across the three groups.

4.7.1.1 Descriptive Statistics on Effectiveness (H₁₄)

Table 4.28 displays means, standard deviations and number of respondents in all classifications based on flexible traveling behavior.

Table 4.28: Descriptive Statistics on Effectiveness

Dependent Variable: PU - Effectiveness

| Interface Design | Classification of Flexible Behavior | Mean | Std. Deviation | N |
|------------------|-------------------------------------|------|----------------|-----|
| Existing | Least Flexible | 4.19 | .452 | 30 |
| | Medium Flexible | 3.19 | .705 | 19 |
| | Highly Flexible | 2.96 | .850 | 76 |
| | Total | 3.29 | .905 | 125 |
| Proposed | Least Flexible | 4.12 | .467 | 30 |
| | Medium Flexible | 3.74 | .653 | 19 |
| | Highly Flexible | 4.03 | .593 | 76 |
| | Total | 4.01 | .584 | 125 |
| Total | Least Flexible | 4.16 | .457 | 60 |
| | Medium Flexible | 3.46 | .725 | 38 |
| | Highly Flexible | 3.50 | .904 | 152 |
| | Total | 3.65 | .839 | 250 |

Respondents with least flexible behavior rated the existing (mean 4.19, S.D 0.452) and proposed systems (mean 4.12, S.D 0.467) relatively higher in terms of their effectiveness. Likewise, respondents with a highly flexible behavior, rated the existing systems lowest in terms of its effectiveness (mean 2.96, S.D 0.850), their rating for the proposed systems is relatively higher in terms of its effectiveness (mean

4.03, S.D 0.593). These means are useful in interpreting the direction of any effects that emerge in further analysis of variance.

4.7.1.2 Two-way Analysis of Variance on Effectiveness (H_{14})

There is a significant effect of user’s classifications on the basis of flexible traveling behavior; since the F-ratio as shown in Table 4.29 is highly significant indicating that the users’ high, medium and low flexible traveling behavior is significantly affected by the proposed and existing systems.

Table 4.29: Two-way ANOVA of Effectiveness

Dependent Variable: PU - Effectiveness

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. |
|----------------------------------|-------------------------|-----|-------------|----------|------|
| Corrected Model | 65.946 ^a | 5 | 13.189 | 29.410 | .000 |
| Intercept | 2493.216 | 1 | 2493.216 | 5559.568 | .000 |
| interfacedesign | 11.941 | 1 | 11.941 | 26.627 | .000 |
| classification | 20.260 | 2 | 10.130 | 22.588 | .000 |
| interfacedesign * classification | 14.003 | 2 | 7.001 | 15.612 | .000 |
| Error | 109.423 | 244 | .448 | | |
| Total | 3504.778 | 250 | | | |
| Corrected Total | 175.369 | 249 | | | |

a. R Squared = .376 (Adjusted R Squared = .363)

4.7.1.3 Error Bars on Effectiveness (H_{14})

Figure 4.11 shows that when the influence of existing and proposed system is ignored, the overall effectiveness of systems is very similar for users’ with medium and high flexible behavior, as the means of these two groups are approximately equal. However the perceived effectiveness of the system for users’ with least flexible behavior, not only differs from the other two groups, it remains also higher.

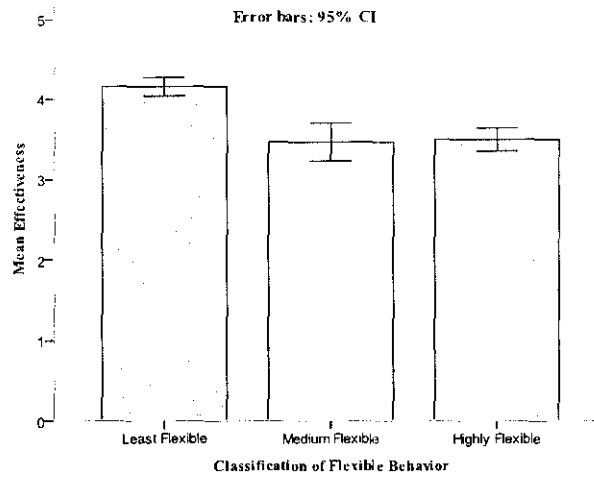


Figure 4.11: Effect of User Classification of Flexible Behavior on Perceived Effectiveness

When the effect of existing and proposed systems is examined on perceived effectiveness, there was a significant main effect, $F(1, 244) = 26.627, p < .001$. The same data when examined in error bars as shown in Figure 4.12, the means of proposed and existing systems were observed to be dissimilar or not equal, indicating a probable significant relationship.

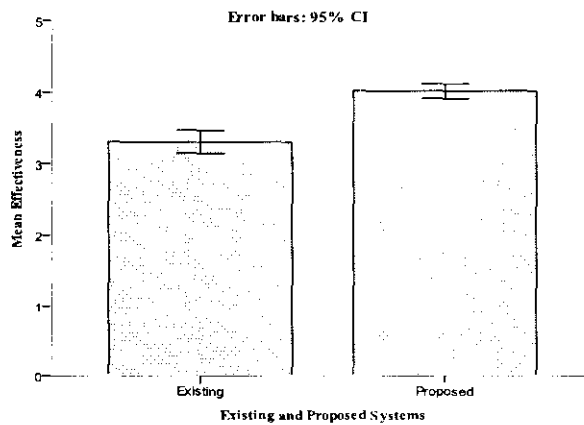


Figure 4.12: Effect of Existing and Proposed Systems on Perceived Effectiveness

4.7.1.4 Interaction Effect on Effectiveness (H_{14})

In Figure 4.13, the effectiveness of the proposed system is higher for users' classified as with medium and high flexible behavior (1 – Least effective, 5- Highly effective). However, for users with least flexible behavior, the effectiveness of the existing

system is marginally higher than the proposed one. The perceived effectiveness of the existing and proposed system for users with least flexible behavior also shares an interaction effect and F-test results further reveal a significant interaction between the effect of existing and proposed online reservation systems and the user classifications on perceived effectiveness, $F(2, 244) = 15.612, p < .001$.

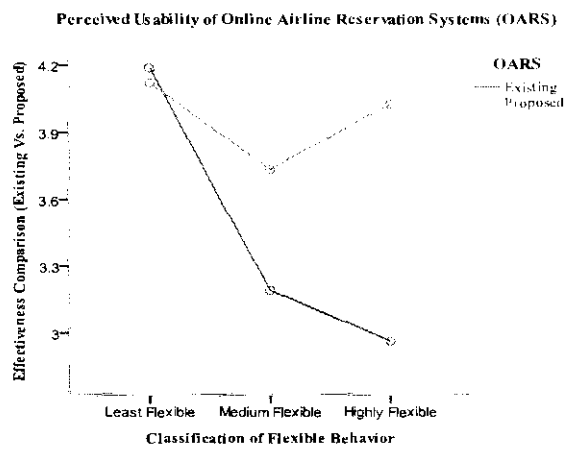


Figure 4.13: Interaction Effect of Existing and Proposed Systems on Perceived Effectiveness

4.7.1.5 Descriptive Statistics on Efficiency (H_{14})

Table 4.30 displays means, standard deviations and number of respondents in all classifications based on flexible traveling behavior.

Table 4.30: Descriptive Statistics on Efficiency

| Dependent Variable: PU - Efficiency | | | | |
|-------------------------------------|-------------------------------------|------|----------------|-----|
| Interface Design | Classification of Flexible Behavior | Mean | Std. Deviation | N |
| Existing | Least Flexible | 4.19 | .358 | 30 |
| | Medium Flexible | 3.79 | .298 | 19 |
| | Highly Flexible | 3.71 | .558 | 76 |
| | Total | 3.83 | .521 | 125 |
| Proposed | Least Flexible | 4.01 | .514 | 30 |
| | Medium Flexible | 3.84 | .661 | 19 |
| | Highly Flexible | 4.00 | .473 | 76 |
| | Total | 3.98 | .514 | 125 |
| Total | Least Flexible | 4.10 | .448 | 60 |
| | Medium Flexible | 3.82 | .506 | 38 |
| | Highly Flexible | 3.85 | .535 | 152 |
| | Total | 3.91 | .521 | 250 |

Respondents with least flexible behavior rated the existing (mean 4.19, S.D 0.358) and proposed systems (mean 4.01, S.D 0.514) relatively higher in terms of their efficiency. Likewise, respondents with a highly flexible behavior, although rated the existing systems lowest in terms of its efficiency (mean 3.71, S.D 0.558), their rating for the proposed systems is relatively higher in terms of its efficiency (mean 4.00, S.D 0.473). These means will be useful in interpreting the direction of any effects that emerge in further analysis of variance.

4.7.1.6 Two-way Analysis of Variance on Efficiency (H_{14})

There is a significant effect of user's classifications on the basis of flexible traveling behavior; since the F-ratio as shown in Table 4.31 is highly significant indicating that the users' high, medium and low flexible traveling behavior is significantly affected by the proposed and existing systems.

Table 4.31: Two-way ANOVA of Efficiency

Dependent Variable: PU - Efficiency

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. |
|----------------------------------|-------------------------|-----|-------------|-----------|------|
| Corrected Model | 6.714 ^a | 5 | 1.343 | 5.377 | .000 |
| Intercept | 2793.594 | 1 | 2793.594 | 11186.352 | .000 |
| interfacedesign | .136 | 1 | .136 | .545 | .461 |
| classification | 3.029 | 2 | 1.515 | 6.065 | .003 |
| interfacedesign * classification | 2.436 | 2 | 1.218 | 4.878 | .008 |
| Error | 60.935 | 244 | .250 | | |
| Total | 3880.556 | 250 | | | |
| Corrected Total | 67.648 | 249 | | | |

a. R Squared = .099 (Adjusted R Squared = .081)

4.7.1.7 Error Bars on Efficiency (H_{14})

Figure 4.14 shows that when the influence of existing and proposed system is ignored, the overall efficiency of systems is very similar for users' with medium and high flexible behavior, as the means of these two groups are approximately equal. However the perceived efficiency of the system for users' with least flexible behavior, not only differs from the other two groups, it remains also higher.

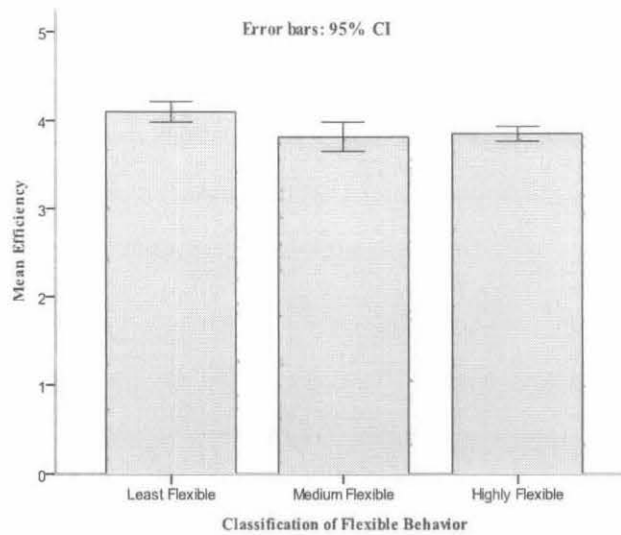


Figure 4.14: Effect of User Classification of Flexible Behavior on Perceived Efficiency

When the effect of existing and proposed systems is examined on perceived efficiency, there was not a significant main effect, $F(1, 244) = 0.545$, $p = .461$. The same data when examined in error bars Figure 4.15, the means of proposed and existing systems were observed to be similar or equal, indicating a probable insignificant relationship.

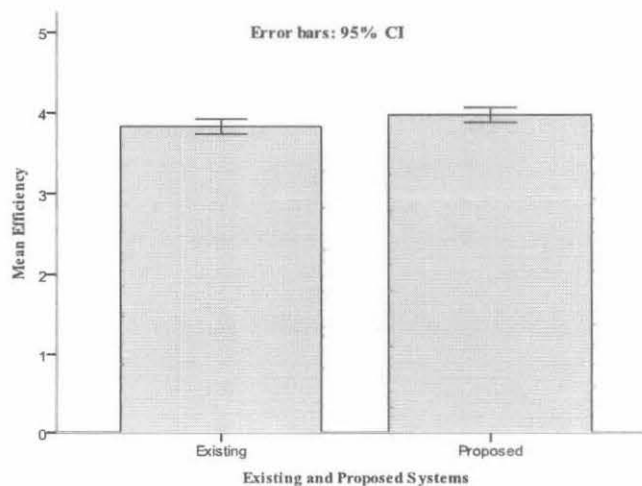


Figure 4.15: Effect of Existing and Proposed Systems on Perceived Efficiency

4.7.1.8 Interaction Effect on Efficiency (H_{14})

In Figure 4.16, the efficiency of the proposed system is higher for users' classified as with medium and high flexible behavior (1 – Least effective, 5- Highly effective).

However, for users with least flexible behavior, the efficiency of the existing system is marginally higher than the proposed one. The perceived efficiency of the existing and proposed system for users with least flexible behavior also shares an interaction effect and F-test results further reveal a significant interaction between the effect of existing and proposed online reservation systems and the user classifications on perceived efficiency, $F(2, 244) = 4.878, p < .05$.

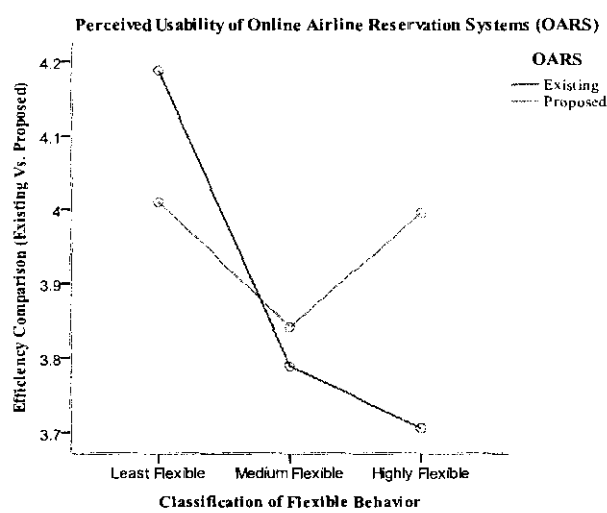


Figure 4.16: Interaction Effect of Existing and Proposed Systems on Perceived Efficiency

4.7.1.9 Descriptive Statistics on Satisfaction (H_{14})

Table 4.32 displays means, standard deviations and number of respondents in all classifications based on flexible traveling behavior.

Respondents with least flexible behavior rated the existing (mean 4.10, S.D 0.377) and proposed system (mean 4.04, S.D 0.393) relatively higher in terms of their satisfaction, and their satisfaction has also fallen by 6% with proposed systems. Likewise, respondents with a highly flexible behavior, although rated the existing systems lowest in terms of satisfaction (mean 3.44, S.D 0.576), their rating for the proposed systems is relatively higher in terms of satisfaction (mean 3.68, S.D 0.556). These means will be useful in interpreting the direction of any effects that emerge in further analysis of variance.

Table 4.32: Descriptive Statistics of Satisfaction

Dependent Variable: PU - Satisfaction

| Interface Design | Classification of Flexible Behavior | Mean | Std. Deviation | N |
|-------------------------|--|-------------|-----------------------|----------|
| Existing | Least Flexible | 4.10 | .377 | 30 |
| | Medium Flexible | 3.60 | .348 | 19 |
| | Highly Flexible | 3.44 | .576 | 76 |
| | Total | 3.62 | .573 | 125 |
| Proposed | Least Flexible | 4.04 | .393 | 30 |
| | Medium Flexible | 3.80 | .582 | 19 |
| | Highly Flexible | 3.92 | .417 | 76 |
| | Total | 3.93 | .443 | 125 |
| Total | Least Flexible | 4.07 | .383 | 60 |
| | Medium Flexible | 3.70 | .484 | 38 |
| | Highly Flexible | 3.68 | .556 | 152 |
| | Total | 3.78 | .534 | 250 |

4.7.1.10 Two-way Analysis of Variance (H_{14})

There is a significant effect of user's classifications on the basis of flexible traveling behavior; since the F-ratio is highly significant as shown in Table 4.33 indicating that the users' high, medium and low flexible traveling behavior is significantly affected by the proposed and existing systems.

Table 4.33: Two-way ANOVA of Satisfaction

Dependent Variable: PU - Satisfaction

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. |
|----------------------------------|--------------------------------|-----------|--------------------|-----------|-------------|
| Corrected Model | 16.230 ^a | 5 | 3.246 | 14.454 | .000 |
| Intercept | 2646.191 | 1 | 2646.191 | 11782.881 | .000 |
| interfacedesign | 1.960 | 1 | 1.960 | 8.728 | .003 |
| classification | 6.952 | 2 | 3.476 | 15.477 | .000 |
| interfacedesign * classification | 3.311 | 2 | 1.656 | 7.372 | .001 |
| Error | 54.797 | 244 | .225 | | |
| Total | 3636.516 | 250 | | | |
| Corrected Total | 71.028 | 249 | | | |

a. R Squared = .229 (Adjusted R Squared = .213)

4.7.1.11 Error Bars on Satisfaction (H_{14})

Figure 4.17 represent the error bars on satisfaction.

When the influence of existing and proposed system is ignored, the overall satisfaction of systems is very similar for users' with medium and high flexible behavior, as the means of these two groups are approximately equal. However the perceived satisfaction of the system for users' with least flexible behavior, not only differs from the other two groups, it remains also higher.

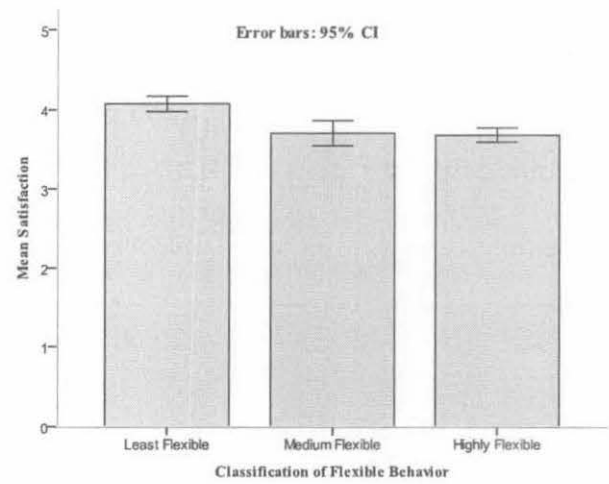


Figure 4.17: Effect of User Classification of Flexible Behavior on Perceived Satisfaction

When the effect of existing and proposed systems is examined on perceived satisfaction, there was a significant main effect, $F(1, 244) = 8.728, p < .05$. The same data when examined in error bars Figure 4.18, the means of proposed and existing systems were observed to be dissimilar or not equal, indicating a probable significant relationship.

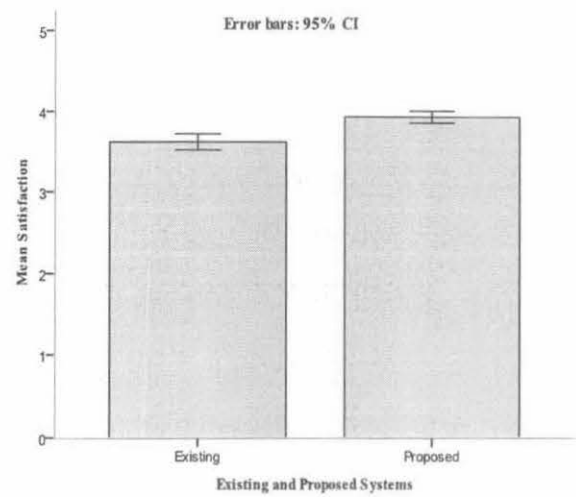


Figure 4.18: Effect of Existing and Proposed Systems on Perceived Satisfaction

4.7.1.12 Interaction Effect on Satisfaction (H_{1d})

In Figure 4.19, the satisfaction of the proposed system is higher for users' classified as with medium and high flexible behavior (1 – Least effective, 5- Highly effective). However, for users with least flexible behavior, the satisfaction of the existing system is marginally higher than the proposed one. The perceived efficiency of the existing and proposed system for users with least flexible behavior also shares an interaction effect and F-test results further reveal a significant interaction between the effect of existing and proposed online reservation systems and the user classifications on perceived satisfaction, $F(2, 244) = 7.372, p < .05$.

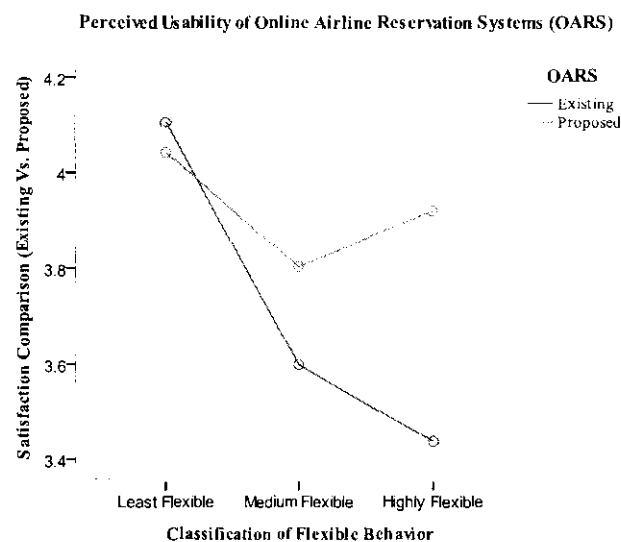


Figure 4.19: Interaction Effect of Existing and Proposed Systems on Perceived Satisfaction

4.7.1.13 Levene's Test on Existing Systems (H_{1d})

Results of Levene's Test as shown in Table 4.34 show non-significant results ($p=.140>.05$) indicating homogeneity of variance assumption being met, therefore, post hoc analysis can be performed by using Scheffe Test.

Table 4.34: Levene's Test on Existing Systems

| Dependent Variable: Perceived Usability (Effectiveness+Efficiency+Satisfaction) | | | |
|---|-----|-----|------|
| F | df1 | df2 | Sig. |
| 1.995 | 2 | 122 | .140 |

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + classification + interfacedesign + classification * interfacedesign

4.7.1.14 Post-hoc Multiple Comparisons on Existing Systems (H_{14})

Post-hoc Multiple Comparisons using Scheffe Test is shown in Table 4.35. In case of existing systems, users' classified as with High, Medium and Low flexible behavior did not differ from one another in terms of rating Perceived Usability of the existing OARS.

Table 4.35: Post-hoc Scheffe Multiple Comparison Using Scheffe to Test Users' Classification for Existing Systems

Dependent Variable: Perceived Usability (Effectiveness, Efficiency, Satisfaction) of Existing Systems

| (I) Classification of Flexible Behavior | (J) Classification of Flexible Behavior | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|-----------------------|------------|------|-------------------------|-------------|
| | | | | | Lower Bound | Upper Bound |
| Least Flexible | Medium Flexible | .2645 | .13027 | .132 | -.0583 | .5873 |
| | Highly Flexible | .0779 | .09580 | .719 | -.1595 | .3153 |
| Medium Flexible | Least Flexible | -.2645 | .13027 | .132 | -.5873 | .0583 |
| | Highly Flexible | -.1866 | .11396 | .266 | -.4690 | .0958 |
| Highly Flexible | Least Flexible | -.0779 | .09580 | .719 | -.3153 | .1595 |
| | Medium Flexible | .1866 | .11396 | .266 | -.0958 | .4690 |

Based on observed means. The error term is Mean Square (Error) = .197.

4.7.1.15 Levene's Test on Proposed Systems (H_{14})

Results of Levene's Test as shown in Table 4.36 show non-significant results ($p = .112 > .05$) indicating homogeneity of variance assumption being met, therefore, post hoc analysis can be performed by using Scheffe Test.

Table 4.36: Levene's Test on Proposed Systems

Dependent Variable:PU4

| F | df1 | df2 | Sig. |
|-------|-----|-----|------|
| 5.799 | 2 | 122 | .112 |

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.
a. Design: Intercept + classification + interfacedesign + classification * interfacedesign

4.7.1.16 Post-hoc Multiple Comparisons on Proposed Systems (H_{14})

Table 4.37 shows post hoc multiple comparison of Users' classification on the basis of their flexible traveling behavior. In rating Perceived Usability of the proposed FOARS, Users' classified as with Least Flexible in their traveling behavior differed

significantly from Users' classified as with Medium Flexible (at $p < .001$) and Highly Flexible (at $p < .001$) and vice versa.

Table 4.37: Post-hoc Multiple Comparison Using to Scheffe Test Users' Classification for Proposed Systems

Dependent Variable: Perceived Usability (Effectiveness, Efficiency, Satisfaction) of Proposed Systems

| (I) Classification of Flexible Behavior | (J) Classification of Flexible Behavior | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|--|---|-----------------------------|---------------|------|----------------------------|----------------|
| | | | | | Lower Bound | Upper Bound |
| Least Flexible | Medium Flexible | .6336* | .14926 | .000 | .2637 | 1.0035 |
| | Highly Flexible | .7911* | .10977 | .000 | .5191 | 1.0631 |
| Medium Flexible | Least Flexible | -.6336* | .14926 | .000 | -1.0035 | -.2637 |
| | Highly Flexible | .1575 | .13058 | .485 | -.1661 | .4811 |
| Highly Flexible | Least Flexible | -.7911* | .10977 | .000 | -1.0631 | -.5191 |
| | Medium Flexible | -.1575 | .13058 | .485 | -.4811 | .1661 |

Based on observed means. The error term is Mean Square(Error) = .259.

*. The mean difference is significant at the .05 level.

4.8 Phase III: Effect of Users' Flexibility on Proposed Systems

This study is to address the 8th research question.

RQ8: Is there a multivariate main effect of user's Flexible Traveling Behavior (High, Medium and Low) on effectiveness, efficiency and satisfaction of the proposed system?

4.8.1 Hypothesis Testing H_{15}

H_{15} : There are differences among effectiveness, efficiency and satisfaction caused by the users' Flexible Traveling Behavior.

4.8.1.1 Scatter Plots (H_{15})

Pair wise nonlinear relationships between dependent variables using scatter plots are shown in Figure 4.20, 4.21 and 4.22. In Effectiveness Versus Efficiency, Effectiveness Versus Satisfaction, Efficiency Versus Satisfaction, Strong, positive,

linear relationships is observed as one variable increases in value, the other variable tends to also increase.

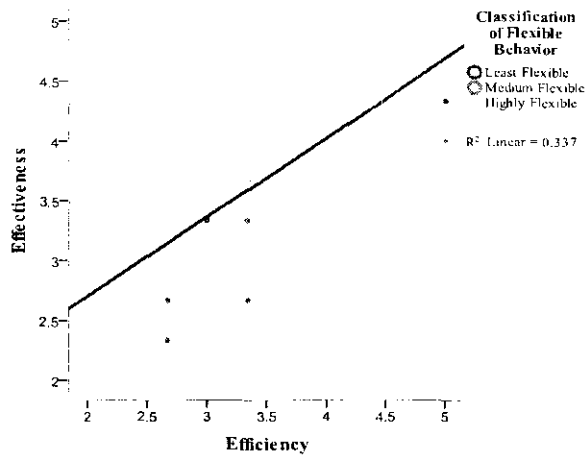


Figure 4.20: Linear Relationship between Effectiveness and Efficiency

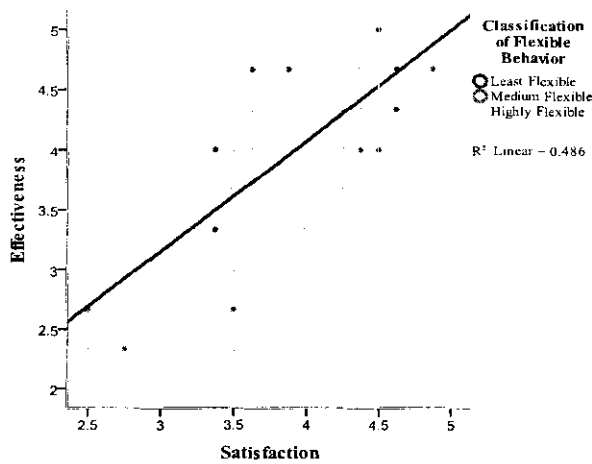


Figure 4.21: Linear Relationship between Effectiveness and Satisfaction

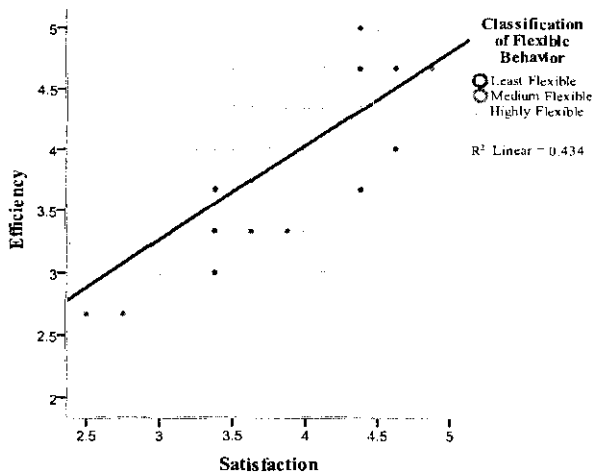


Figure 4.22: Linear Relationship between Efficiency and Satisfaction

4.8.1.2 Homogeneity of Covariance's (H_{15})

The second assumption of multivariate analysis was met by examining Box's M, which tests the hypothesis that the covariance matrices of the dependent variables are significantly different across levels of the independent variable as show in Table 4.38.

Table 4.38: Box's Test of Equality of Covariance Matrices

| | |
|---|-----------|
| Box's M | 16.935 |
| F | 1.337 |
| df1 | 12 |
| df2 | 14037.348 |
| Sig. | .189 |
| Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups. | |

Results showed non-significant results ($p = .189 > .001$) hence indicating that the assumption has not been violated.

The overall F test for the three dependent variables was examined in Multivariate Tests as shown in Table 4.39 by analyzing the statistic called Wilks' lambda (λ), and the F value associated with that. In the case of Independent Variable (IV), User classifications on the basis of their flexible traveling behavior, Wilks' lambda is .667, and has an associated F of 8.971, which is significant at $p < .001$. Furthermore, the partial eta squared (partial ϵ^2) associated with the main effect of Users' classification is .183 and the power to detect the main effect is 1. Thus, H_{15} was accepted.

Initial interpretation of results based on one-way MANOVA have revealed a significant multivariate main effect for User' classifications, Wilks' $\lambda = .667$, $F(6, 240.000) = 8.971$, $p < .001$, partial $\epsilon^2 = .183$. Power to detect the effect was 1. Thus, H_{15} was accepted due to statistically significant impact of Users' classification on three dependent variables measuring users' Perceived Usability of the proposed FOARS. Since, the results for hypothesis testing were statistically significant, so follow-up tests were performed and interpreted.

Table 4.39: Multivariate Tests

| | Effect | Value | F | Hypothesis df | Error df | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power ^b |
|----------------|--------------------|--------|-----------|------------------|-------------|------|------------------------|-----------------------|--------------------------------|
| Intercept | Pillai's Trace | .982 | 2188.873a | 3.000 | 120.000 | .000 | .982 | 6566.620 | 1.000 |
| | Wilks' Lambda | .018 | 2188.873a | 3.000 | 120.000 | .000 | .982 | 6566.620 | 1.000 |
| | Hotelling's Trace | 54.722 | 2188.873a | 3.000 | 120.000 | .000 | .982 | 6566.620 | 1.000 |
| | Roy's Largest Root | 54.722 | 2188.873a | 3.000 | 120.000 | .000 | .982 | 6566.620 | 1.000 |
| Classification | Pillai's Trace | .333 | 8.069 | 6.000 | 242.000 | .000 | .167 | 48.416 | 1.000 |
| | Wilks' Lambda | .667 | 8.971a | 6.000 | 240.000 | .000 | .183 | 53.828 | 1.000 |
| | Hotelling's Trace | .498 | 9.876 | 6.000 | 238.000 | .000 | .199 | 59.259 | 1.000 |
| | Roy's Largest Root | .496 | 20.013c | 3.000 | 121.000 | .000 | .332 | 60.038 | 1.000 |

a. Exact statistic
b. Computed using alpha = .05
c. The statistic is an upper bound on F that yields a lower bound on the significance level.
d. Design: Intercept + classification

4.8.1.3 Alpha Adjustment (H_{15})

The experiment-wise alpha protection provided by the overall or omnibus F test does not extend to the univariate tests. It is thus important to make an alpha adjustment to account for multiple ANOVAs being run. Hence, confidence level is divided by the number of tests to be performed, as in this case, F tests for the three dependent variables is required to be at $p < 0.017$ ($.05/3$).

4.8.1.4 Univariate ANOVAs (H_{15})

Table 4.40 shows that Users' classification on the basis of their flexible traveling behavior have a statistically significant effect on three dependent variables assessing Perceived Usability of FOARS, Effectiveness ($F(2, 122) = 28.680$; $p = .000 < .017$; partial $\epsilon^2 = .320$), Efficiency ($F(2, 122) = 10.776$; $p = .000 < .017$; partial $\epsilon^2 = .15$) and Satisfaction ($F(2, 122) = 18.738$; $p = .000 < .017$; partial $\epsilon^2 = .235$).

Table 4.40: Univariate ANOVAs

| Source | Dependent Variable | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power ^b |
|-----------------|--------------------|-------------------------|-----|-------------|----------|------|---------------------|--------------------|-----------------------------|
| Corrected Model | PU - Effectiveness | 32.449 ^a | 2 | 16.225 | 28.680 | .000 | .320 | 57.360 | 1.000 |
| | PU - Efficiency | 5.058 ^c | 2 | 2.529 | 10.776 | .000 | .150 | 21.551 | .989 |
| | PU - Satisfaction | 9.572 ^d | 2 | 4.786 | 18.738 | .000 | .235 | 37.475 | 1.000 |
| Intercept | PU - Effectiveness | 1080.033 | 1 | 1080.033 | 1909.144 | .000 | .940 | 1909.144 | 1.000 |
| | PU - Efficiency | 1377.358 | 1 | 1377.358 | 5868.105 | .000 | .980 | 5868.105 | 1.000 |
| | PU - Satisfaction | 1252.057 | 1 | 1252.057 | 4901.941 | .000 | .976 | 4901.941 | 1.000 |
| classification | PU - Effectiveness | 32.449 | 2 | 16.225 | 28.680 | .000 | .320 | 57.360 | 1.000 |
| | PU - Efficiency | 5.058 | 2 | 2.529 | 10.776 | .000 | .150 | 21.551 | .989 |
| | PU - Satisfaction | 9.572 | 2 | 4.786 | 18.738 | .000 | .235 | 37.475 | 1.000 |
| Error | PU - Effectiveness | 69.017 | 122 | .566 | | | | | |
| | PU - Efficiency | 28.636 | 122 | .235 | | | | | |
| | PU - Satisfaction | 31.161 | 122 | .255 | | | | | |
| Total | PU - Effectiveness | 1457.222 | 125 | | | | | | |
| | PU - Efficiency | 1871.778 | 125 | | | | | | |
| | PU - Satisfaction | 1680.594 | 125 | | | | | | |
| Corrected Total | PU - Effectiveness | 101.467 | 124 | | | | | | |
| | PU - Efficiency | 33.694 | 124 | | | | | | |
| | PU - Satisfaction | 40.733 | 124 | | | | | | |

a. R Squared = .320 (Adjusted R Squared = .309)

b. Computed using alpha = .05

c. R Squared = .150 (Adjusted R Squared = .136)

d. R Squared = .235 (Adjusted R Squared = .222)

4.8.2 Hypothesis Testing H₁₆

H₁₆: Effectiveness, efficiency and satisfaction in the proposed FOARS is highest for users with highest flexible behavior.

4.8.2.1 Descriptive Statistics on Perceived Usability (H₁₆)

The descriptive analysis on Effectiveness, Efficiency and Satisfaction is presented in Table 4.41 and bar charts are shown in Figure 4.23, 4.24 and 4.25, respectively.

Table 4.41: Descriptive Statistics on PU

| Classification of Flexible Behavior | | Mean | Std. Deviation | N |
|-------------------------------------|-----------------|------|----------------|-----|
| PU - Effectiveness | Highly Flexible | 4.16 | .457 | 60 |
| | Medium Flexible | 3.46 | .725 | 38 |
| | Least Flexible | 3.50 | .904 | 152 |
| | Total | 3.65 | .839 | 250 |
| PU - Efficiency | Highly Flexible | 4.10 | .448 | 60 |
| | Medium Flexible | 3.82 | .506 | 38 |
| | Least Flexible | 3.85 | .535 | 152 |
| | Total | 3.91 | .521 | 250 |
| PU - Satisfaction | Highly Flexible | 4.07 | .383 | 60 |
| | Medium Flexible | 3.70 | .484 | 38 |
| | Least Flexible | 3.68 | .556 | 152 |
| | Total | 3.78 | .534 | 250 |

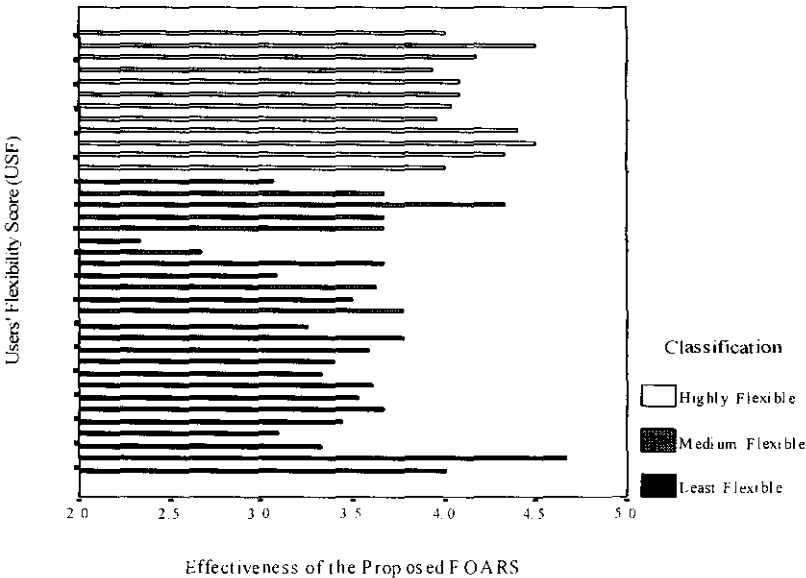


Figure 4.23: Bar Chart Showing Effectiveness of the Proposed System

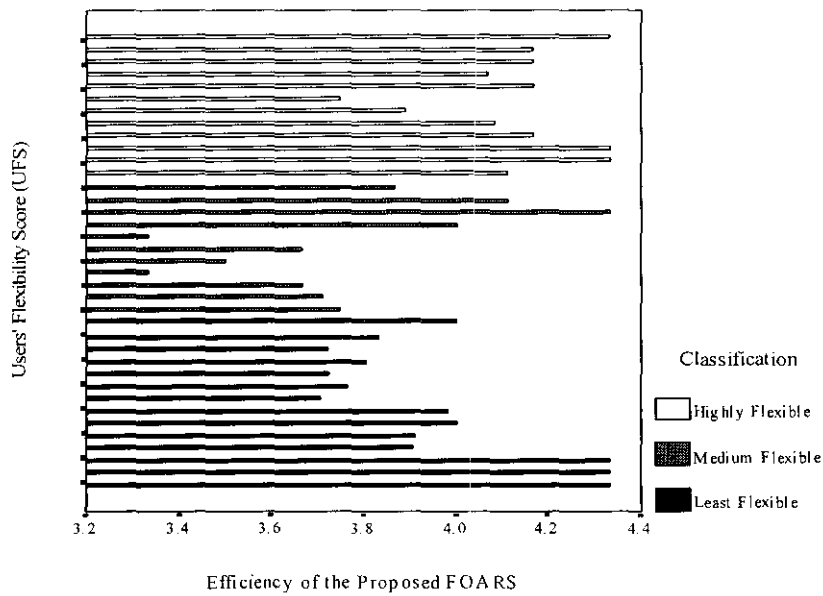


Figure 4.24: Bar Chart Showing Efficiency of the Proposed System

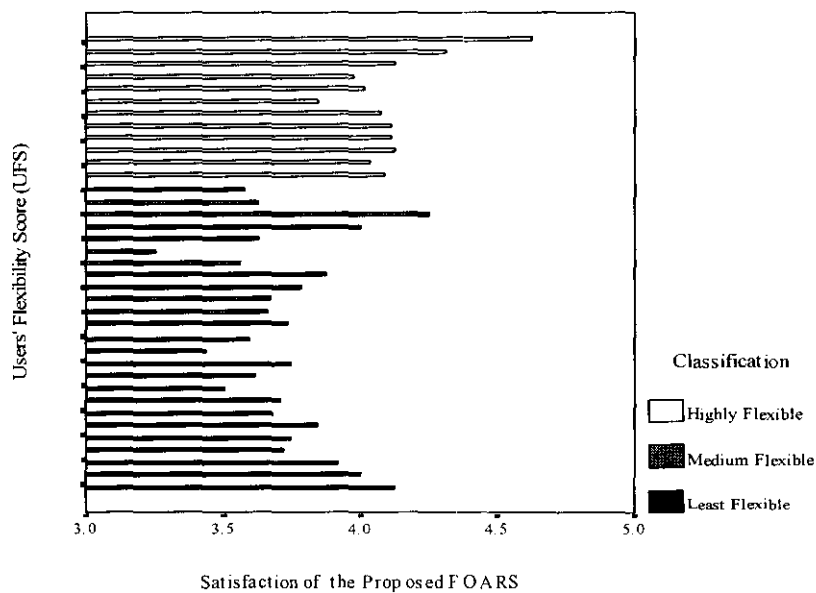


Figure 4.25: Bar Chart Showing Satisfaction of the Proposed System

4.8.2.2 Levene's Test of Equality of Error Variances (H_{10})

Homogeneity of variances for the three dependent variables with significant Univariate ANOVAs was examined as shown in Table 4.42. The Levene's statistics for the three DVs showed non-significant results (Effectiveness; $p = .401 > .05$, Efficiency; $p = .051 > 0.05$, Satisfaction; $p = .200 > 0.05$). This indicated that the

group variances were equal and post-hoc comparison of pair wise group means could be examined by computing Sheffé test and Games-Howell.

Table 4.42: Levene's Test of Equality of Error Variances

| | F | df1 | df2 | Sig. |
|--------------------|-------|-----|-----|------|
| PU - Effectiveness | .921 | 2 | 122 | .401 |
| PU - Efficiency | 3.048 | 2 | 122 | .051 |
| PU - Satisfaction | 1.631 | 2 | 122 | .200 |

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.
a. Design: Intercept + users' classification

4.8.2.3 Alpha Corrections for Post-hoc Multiple Comparisons (H_{16})

Since Post Hoc multiple comparisons involve 9 tests to be performed therefore, confidence level has been reset at $.05/9=.005$. Post Hoc multiple comparisons in terms of means scores are shown in Table 4.43.

4.8.2.4 Post-hoc Multiple Comparisons (H_{16})

Post-hoc Multiple Comparisons using Scheffe Test is shown in Table 4.43. In case of existing systems, users' classified as with High, Medium and Low flexible behavior did not differ from one another in terms of rating Perceived Usability of the existing OARS.

Effectiveness – in terms of effectiveness of the proposed system, users with highly flexible behavior differed significantly from users with medium ($p=.000<.005$) and least flexible ($p=.000<.005$) behavior. This is also evident from descriptive statistics table that users with highly flexible behavior rated the proposed systems effectiveness highest ($M=4.16$, $SD =.457$) which is way above the average rating by other groups.

Efficiency – in terms of efficiency of the proposed system, users with highly flexible behavior differed significantly from users with least flexible ($p=.000<.005$) behavior. This is also evident from descriptive statistics table that users with highly flexible behavior rated the proposed systems efficiency highest ($M=4.10$, $SD =.448$).

Satisfaction – in terms of satisfaction of the proposed system, users with highly flexible behavior differed significantly from users with medium ($p=.004<.005$) and least flexible ($p=.000<.005$) behavior. This is also evident from descriptive statistics table that users with highly flexible behavior rated the proposed systems satisfaction highest ($M=4.07$, $SD=.383$) which is way above the average rating by other groups.

Based on these results H_{16} is accepted since users with highly flexible behavior differed significantly from users with medium and low flexible behavior in terms of rating effectiveness, efficiency and satisfaction of the proposed system.

Table 4.43: Post-hoc Multiple Comparisons using Scheffe

| Dependent Variable | | (I) Classification of Flexible Behavior | (J) Classification of Flexible Behavior | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|--------------------|--------------|---|---|-----------------------|------------|------|-------------------------|-------------|
| | | | | | | | Lower Bound | Upper Bound |
| PU - Effectiveness | Scheffe | Highly Flexible | Medium Flexible | 1.00* | .221 | .000 | .45 | 1.54 |
| | | | Least Flexible | 1.22* | .162 | .000 | .82 | 1.63 |
| | | Medium Flexible | Least Flexible | -1.00* | .221 | .000 | -1.54 | -.45 |
| | | | Highly Flexible | .23 | .193 | .499 | -.25 | .71 |
| | | Least Flexible | Highly Flexible | -1.22* | .162 | .000 | -1.63 | -.82 |
| | | | Medium Flexible | -.23 | .193 | .499 | -.71 | .25 |
| | Games-Howell | Highly Flexible | Medium Flexible | 1.00* | .182 | .000 | .55 | 1.45 |
| | | | Least Flexible | 1.22* | .128 | .000 | .92 | 1.53 |
| | | Medium Flexible | Least Flexible | -1.00* | .182 | .000 | -1.45 | -.55 |
| | | | Highly Flexible | .23 | .189 | .458 | -.24 | .69 |
| | | Least Flexible | Highly Flexible | -1.22* | .128 | .000 | -1.53 | -.92 |
| | | | Medium Flexible | -.23 | .189 | .458 | -.69 | .24 |
| PU - Efficiency | Scheffe | Highly Flexible | Medium Flexible | .40* | .142 | .022 | .05 | .75 |
| | | | Least Flexible | .48* | .104 | .000 | .22 | .74 |
| | | Medium Flexible | Least Flexible | -.40* | .142 | .022 | -.75 | -.05 |
| | | | Highly Flexible | .08 | .124 | .799 | -.22 | .39 |
| | | Least Flexible | Highly Flexible | -.48* | .104 | .000 | -.74 | -.22 |
| | | | Medium Flexible | -.08 | .124 | .799 | -.39 | .22 |
| | Games-Howell | Highly Flexible | Medium Flexible | .40* | .095 | .000 | .17 | .63 |
| | | | Least Flexible | .48* | .091 | .000 | .26 | .70 |
| | | Medium Flexible | Least Flexible | -.40* | .095 | .000 | -.63 | -.17 |
| | | | Highly Flexible | .08 | .094 | .649 | -.14 | .31 |
| | | Least Flexible | Highly Flexible | -.48* | .091 | .000 | -.70 | -.26 |
| | | | Medium Flexible | -.08 | .094 | .649 | -.31 | .14 |

Table 4.43: Post-hoc Multiple Comparisons using Scheffe (continue)

| Dependent Variable | (I) Classification of Flexible Behavior | (J) Classification of Flexible Behavior | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | | |
|--------------------|---|---|-----------------------|------------|------|-------------------------|-------------|------|
| | | | | | | Lower Bound | Upper Bound | |
| PU - Satisfaction | Scheffe | Highly Flexible | Medium Flexible | .51* | .148 | .004 | .14 | .87 |
| | | Least Flexible | .67* | .109 | .000 | .40 | .94 | |
| | Medium Flexible | Least Flexible | -.51* | .148 | .004 | -.87 | -.14 | |
| | | Highly Flexible | .16 | .130 | .464 | -.16 | .48 | |
| | Least Flexible | Highly Flexible | -.67* | .109 | .000 | -.94 | -.40 | |
| | | Medium Flexible | -.16 | .130 | .464 | -.48 | .16 | |
| | Games-Howell | Highly Flexible | Medium Flexible | .51* | .105 | .000 | .25 | .76 |
| | | | Least Flexible | .67* | .095 | .000 | .44 | .89 |
| | | Medium Flexible | Least Flexible | -.51* | .105 | .000 | -.76 | -.25 |
| | | | Highly Flexible | .16 | .104 | .275 | -.09 | .41 |
| | | Least Flexible | Highly Flexible | -.67* | .095 | .000 | -.89 | -.44 |
| | | | Medium Flexible | -.16 | .104 | .275 | -.41 | .09 |

Based on observed means.

The error term is Mean Square(Error) = .255.

*. The mean difference is significant at the .05 level.

4.9 Chapter Summary

In this chapter the results obtained from the studies and case study are presented. To achieve this goal, this chapter followed the research objectives as described earlier in Chapter 3 with corresponding hypothesis to organize the results. The results obtained from the studies helped identified assessing user needs in terms of System's Flexibility and Users' Flexibility. This was followed by the classification of users on the basis of their flexible traveling behavior. To validate the proposed framework for the development of flexible online airline reservations systems, a case study was conducted. The case study was conducted using quantitative technique whereby participants were requested to report their effectiveness, efficiency and satisfaction with the proposed systems using prototype. The results are discussed in detail in Chapter 5.

CHAPTER 5

DISCUSSION

5.0 Chapter Overview

This chapter discusses the results obtained in chapter 4 based on five different studies and a case study. The overall research was based on investigating three core research objectives with eight corresponding research questions and sixteen corresponding hypothesis. Results obtained during the study supported most of the hypotheses as shown in Table 5.1. The following sections will discuss these results in detail.

To achieve the 1st research objective, Section 5.1, 5.2 and 5.3 are dedicated for the discussion on the results obtained from the three studies conducted in Phase I answering the corresponding research questions RQ1, RQ2 and RQ3, respectively. To attain the 2nd research objective, Section 5.4 and 5.5 present discussions on the results obtained from the two studies conducted in Phase II answering the corresponding research questions RQ4 and RQ5, respectively. To conquer the 3rd research objective, Section 5.6, 5.7 and 5.8 are devoted for the discussion on the results obtained from the case study answering the corresponding research questions RQ6, RQ7 and RQ8, respectively.

Finally, Section 5.9 discusses the recommendations for the designing of flexible Online Airline Reservation Systems and Section 5.10 cover the chapter summary.

Table 5.1: Summary of Research Questions, Hypotheses and Results

| Research Objectives | Research Questions | Hypotheses | Results |
|--|--|---|---------------|
| To assess user needs (System's Flexibility and Users' Flexibility) associated with Online Airline Reservation Systems. | RQ1: What are the issues with flexibility of Online Airline Reservation Systems, whether or not flexibility is one of the reasons for users not using such systems? | H₁: Non-functional Requirements are perceived to have an impact on the usability of OARS. | Supported |
| | | H₂: Functional Requirements are perceived to have an impact on the usability of OARS. | Not Supported |
| | | H₃: The perceived flexibility of OARS affects the usability of such systems. | Supported |
| | | H₄: Functional Requirements of OARS are inversely associated with the flexibility of the systems. | Supported |
| | | H₅: The availability of resources and skills set influence upon the usability of OARS. | Supported |
| | RQ2: To what extent flexible users can compromise with service quality attributes of Online Airline Reservation Systems? | H₆: The level of satisfaction with existing SBTs is different for respondents with different attitudes towards Users' Flexibility in compromising on SQAs of the airline. | Supported |
| | | H₇: The level of satisfaction with existing OTAs is different for respondents with different attitudes towards Users' Flexibility in compromising on SQAs of the airline. | Supported |
| | RQ3: How users' satisfaction with an existing SBTs is rated against their choice of OTA feature and reflected in their integration assessment of the same for making SBTs more flexible Online Airline Reservation Systems? | H₈: Users' satisfaction with existing SBTs is different across their choice of four OTA features for making SBTs more FOARS. | Supported |

Table 5.1: Summary of Research Questions, Hypotheses and Results (continue)

| Research Objectives | Research Questions | Hypotheses | Results |
|---|--|---|---------------------|
| To investigate users' perception on factors influencing Flexible Traveling Behavior and to classify them on the basis of their Flexible Traveling Behavior. | RQ4: How users' perception on factors influencing flexible traveling behavior and flexible OARS is determined? | — | Supported |
| | RQ5: How to classify Users' on the basis of their Flexible Traveling Behavior into High, Medium and Low flexible and how to investigate interrelationships among System's Flexibility, Users' Flexibility and Perceived Usability of existing Online Airline Reservation Systems? | H₉: Users can be classified on the basis of their Flexible Traveling Behavior. | Supported |
| | | H₁₀: User's Flexible Behavior and their Perceived Usability is correlated. | Supported |
| | | H₁₁: User's Flexible Behavior and System's Flexibility is correlated. | Partially Supported |
| | | H₁₂: Perceived Usability of OARS is not affected by users' Flexible Traveling Behavior after adjusting for the effect of the covariate, System's Flexibility. | Supported |
| To study the relationship between users' Perceived Usability and travelers Flexible Traveling Behavior with existing and proposed Online Airline Reservation Systems. | RQ6: How do service quality attributes of airlines and external variables jointly predict flexible behavior of travelers? | H₁₃: Flexible behavior of travelers cannot be predicted by service quality attributes and external variables. | Supported |
| | RQ7: How does user Perceived Usability with the existing and the proposed system differs? | H₁₄: User Perceived Usability with existing and proposed systems is different across the three groups. | Supported |
| | RQ8: Is there a multivariate main effect of user's Flexible Traveling Behavior (High, Medium and Low) on effectiveness, efficiency and satisfaction of the proposed system? | H₁₅: There are differences among effectiveness, efficiency and satisfaction caused by the users' Flexible Traveling Behavior. | Supported |
| | | H₁₆: Effectiveness, efficiency and satisfaction in the proposed FOARS is highest for users with highest flexible behavior. | Supported |

5.1 System's Flexibility

In systems engineering, non-functional characteristics are very important [130]. Normally, Functional Requirements (FRs) and Non-Functional Requirements (NFRs) are elicited separately but later they are merged together to assess the satisfaction level of FRs over NFRs [130]. Sometimes, NFRs are so much dependent on FRs that their enhancement is not possible. This is especially true in the case of Transaction Processing Systems where flexibility is sometimes reduced strongly to avoid non-standard operations. Nevertheless, the results of the study suggest that there is a significant relationship between NFRs and FRs and that NFRs (including flexibility) have a strong relationship to the usability of the reservation systems.

However, the statistical results indicate that there is a poor correlation between FRs and the usage of Online Airline Reservation Systems as shown in Chapter 4, Section 4.1.3. The rationale behind these could be that NFRs are always assessed against the availability of FRs. However, users are bound to assess the flexibility of existing online reservation systems on the basis of the FR that they are realistically exposed to. Therefore, when online users are inquired to respond to questions such as what additional FR features they like to see in online reservation systems, they may not conveniently know “what to ask for?” unless they are exposed to such facilities. On the other hand, NFRs such as the flexibility of the offered features are easier to assess. This indicates why customers wish to have a more flexible system rather than having more features.

Furthermore, the data shows that flexibility and other NFR are placed highest in terms of their Cronbach's α score as shown in Chapter 4, Section 4.1.1, which otherwise is low, if the data has multidimensional structures. This indicates that online users perceive the elements of flexibility and NFRs in online reservation systems at almost equal levels, whereas they perceive the elements of FRs less, these being the third-ranked item in terms of its Cronbach's α score.

The finding suggested that, first, the incorporation of flexibility has a significant impact on the usability of online reservation systems as shown in Chapter 4, Section 4.1.4 and, second, FRs and the usability of online systems are perceived to have a

meager influence on each other as discussed above. In contrast to the user's perception, however, one should not overlook, that flexibility is mirrored in functional requirements as well: Typically, one needs to--so to speak--add more buttons to make a system more flexible.

5.2 Users' Flexibility in terms of Compromising on SQAs of OARS

One of the major research questions of this study was to investigate Users' Flexibility towards Online Airline Reservation Systems. As mentioned earlier in Chapter 2, User's Flexibility is nothing but users' ability to rapidly change from one course of action to another and it is reflected in users' decision making behavior [53]. For understanding flexible human behavior, decision making is an important reflection of users thought process. In the context of User's Flexibility, different users may have different needs, interests and wishes to be served and system's effectiveness, efficiency and satisfaction may vary from one user to another based on their usability perception. For some users a system may be very effective but this may not be true for all.

The results of this study as shown in Chapter 4, Section 4.2.1 demonstrated that apparently there was enormous difference between the satisfaction levels of the three respondents groups, which may not be the actual case. Therefore as a follow-up and to backup this, the same data was interpreted using Error Bars with 95% Confidence Intervals (CI). CI of the groups is closely related to the results of the analysis of variance for these groups. The confidence interval for each graph showed a linear pattern of the sample distribution which otherwise appeared to be showing huge variations in the simple means plot as shown in Chapter 4, Section 4.2.1.2. In Error bars it was examined if mean of one group was included in the confidence interval of the other two groups. If yes, then it was interpreted that there was no difference among the groups. It is not relevant whether the error bars 'overlap' but whether the mean of one group 'overlaps' with the error bars of the other [185]. The confidence intervals can overlap by as much as 25 percent of their total length and still show a significant difference between the means for each group. Any more overlap and the results will not be significant [186].

T-Test (User's Flexible Behavior as outcome variable) showed significant results, for H_6 ($t = 36.760$, $df = 169$, $p = 0.000 < 0.001$) and for H_7 ($t = 35.509$, $df = 169$, $p = 0.000 < 0.001$). This indicated the three groups were significantly different in terms of their rated satisfaction in SBTs and OTAs.

For, H_6 and H_7 the difference among the mean satisfaction was found to be statistically significant in ANOVA as shown in Chapter 4, Section 4.2.2.1 and 4.2.4.1 respectively, but that does not indicate which means are actually making the difference. In other words, three groups of respondents are different, but how they are different was yet to be determined. Moreover, in error bar, the size of confidence intervals for the three groups also differed from one another. When F-test with a factor that consists of three or more means and additional exploration of the differences among means is needed to provide specific information on which means are significantly different from each other, Post hoc tests are performed. Therefore, ANOVA results of H_6 and H_7 were further investigated by performing Post-hoc Scheffe's tests. Scheffe's procedure is the most popular of the post hoc procedures, the most flexible, and the most conservative [187]. Scheffe's procedure corrects alpha for all pair-wise or simple comparisons of means, but also for all complex comparisons of means as well.

Post-hoc Scheffé tests as shown in Table 4.5 and Table 4.8 as shown in Chapter 4, Section 4.2.2.2 and 4.2.4.2, respectively demonstrated that in both cases (i.e. satisfaction level with existing SBTs and satisfaction level with existing OTAs) there is a significant difference between the pair of means of the respondents who reported their flexible attitude as "Cannot compromise" on service quality attributes of the airline with those who "Can compromise". The same group of respondents also differed significantly from the group of respondents who reported their flexible attitude as "May compromise" on service quality attributes.

Furthermore, the effect size show that 19% of the total variance in satisfaction with existing self-booking tools and 7.5% of the total variance in satisfaction with existing online travel agencies of the airline is accounted by the flexible attitude of the users in terms of compromising on service quality attributes of the airline. This is suggestive of the fact that there is some meaningful difference among the groups and

hence the level of satisfaction with existing SBTs and OTAs are considered different for respondents with different attitudes towards Users' Flexibility in compromising on service quality attributes of the airline.

5.3 Integration Assessment of OTAs Features into SBTs

Another important research question was related to the integration assessment of Online Travel Agencies (OTAs) features into Self-booking Tools (SBTs). The findings of this study as shown in Chapter 4, Section 4.3.1.1 showed that integration of OTA features would make SBTs more flexible Online Airline Reservation Systems. This was in accordance with PhoCusWright Report 2009 [9] that reported the overall share of online travel agencies is improving day-by-day, and was recorded at 13% in 2008 in US travel market alone and projected to touch 16% in 2011 as mentioned earlier in Chapter 2. This was further justified from Yahoo Travels' claim which says that 76% of all online travel purchases occur as a result of search function. The table presented in Chapter 2 (Section 2.1.2.2, Table 2.2) showed innovative attributes and function that have contributed immensely towards the popular acceptance of OTAs over Airlines' SBTs and are also widely common among travel companies in recent years [1], [16].

The findings of this study showed that respondents who considered integration of OTA features would make SBTs more flexible and also who stated otherwise, reported absolute lower level of satisfaction with hotel search facility as a recommended solution for SBTs as shown in Chapter 4, Section 4.3.1.2. The finding is very much self-explanatory because Hotel Search facility is a popular OTA integrated feature which displays information of multiple hotels, and promotional packages available in deals with specific airlines. However, in the context of SBTs, this feature may not be feasible for integration, since SBTs are self-booking tools offered by an airline, where multiple carrier and hotel reservation sources are not incorporated with the reservation planning.

When we look at the other two OTA features, i.e. Matrix Display and Alternate Airport Search the pattern is quite different and this is the part of interaction effect

that the direction of difference is not in the same direction. Respondents who considered integration of OTA features into SBTs will not necessarily make them flexible, opted for Matrix Display and Alternate Airport Search as their recommended solution for the SBTs. The Matrix display and hotel search features are unique in sense of incorporating multiple sources reservation information. However from integrating into SBTs perspective, they are not feasible because they require merger of multiple information resources, which might not be an acceptable standard for an airline due to its privacy policy and other regulations. On the contrary, alternate airport search is related to providing additional information as well as the extent to which a traveler is willing to be flexible in identifying his/her destination sources. This feature seems practical and has implications for integration into SBTs.

Finally, unlike other OTA innovations, the opaque fare mechanism depends on hidden characteristics of the traveling plan, thus leveraging upon traveling behavior of leisure travelers, who are always up for grabs and less sensitive to traveling plans. This study showed that it is highly recommended by the experts in the airline industry for integration into SBTs. Researchers point out [117] that opaque products are flexible in characteristics; therefore, a seller is in a unique position to offer horizontally differentiated products to customers upon purchase due to the flexibility of assigning pre-determined products to the customer. Opaque mechanics gained popularity due to its very unique price discrimination mechanism [118] which could generate incremental revenue for the airline by deliberating upon price sensitive consumers [119]. In the very short time, opaque selling has attained the status of a competitive lever for the airline, signifying that an airline could suffer revenue loss to its competitors by not opting to offer opaque offers [120].

Airlines secure incremental revenue by way of disposing off their distressed inventory through last-minute sale discounts. The last minute sale discounts are offered at heavily discounted rates. This mechanism has nothing much of 'opaque' or 'hidden' in it. However, this type of direct selling at the last-minute is considered very risky for the airline, since potential travelers prefer to wait for last-minute sales and not purchase in anticipation of heavy discounts [40]. Such a condition may put an airline in a very risky position with potential possibility of revenue loss. That is why

this practice is substantially criticized by analysts and researchers, who refer to it as a vivacious cycle of price degradation that can eventually destroy the airlines [11]. Although opaque fare, matrix display, alternate airport search and hotel search facility are all part of OTAs' innovation, this survey concludes that adoption of opaque fare concept can make SBTs more flexible Online Airline Reservation Systems.

5.4 Users' Perception on Factors Influencing Upon Flexible Traveling Behavior

Investigation of Users' Perception on factors influencing upon Users Flexible Traveling Behavior was also an important research questions. Results of this study as shown in Chapter 4, Section 4.4.1 indicated that users traveling behavior is molded by a number of important personality relevant determinants, both internal and external in characteristics. The findings was supported by other studies mentioning that flexibility is undeterminable without accounting for traveler's flexible traveling behavior in the case of Online Airline Reservation Systems [62].

The responses received through online discussion forums as shown in Chapter 4, Section 4.4.1 identified some very basic key elements that instigate flexibility in a travelers' traveling behavior, especially if he or she is traveling on a non-rigid schedule. For instance, a promotional package offered by a particular airline makes it a lucrative option for travelers who are ready to travel at any alternatively allocated itinerary. Similarly, if an airline does not offer services and comfort to its customers, they are likely to become inflexible for opting to fly with it, even if it offers lower fares. Likewise, travelers flying purpose and flying frequency determines the extent to which he/she is ready to become a flexible traveler. External influences of travelers' family and friends also play an important role in shaping up their flexible traveling behavior. As for the factors that influence upon perception of a flexible online reservation system, our analysis showed that a reservation system is perceived as being flexible if it offers easiness to users in terms of making reservations with minimal skills required, is not complicated in terms of operation and offers multiple features and options to users.

The responses received through in-depth interviews as shown in Chapter 4, Section 4.4.1 instigated flexibility in a travelers' behavior, factors such as airlines reputations and travelers status consciousness contribute towards their flexible traveling behavior. Interestingly, customer loyalty, traveling mileage and patriotism also came into the limelight with our in-depth interviews with travelers. This indicates, if a traveler has a customer loyalty or earned traveling mileage from a particular airline it will influence upon his/her flexible traveling behavior, as well as, how patriotically associated the traveler feels with his/her country's airline. Finally, travelers who wish to live an eco-friendly life supported the idea of the green environment and they were of the view that if an airline supports eco-friendly policies, with lesser carbon emissions and lesser fuel consumption, it will influence upon their flexible traveling behavior as well as flying priorities. Likewise, it was revealed that travelers flexible traveling is also dependent upon their interest taking in recreational and leisure activities. Respondents who indicated that they were frequent flyers attributed flexible traveling behavior directly to their interest in recreational and leisure activities. Some travelers also highlighted that flexible traveling behavior of a single person or an individual is different from the one who is traveling with his/her family. As families with children would prefer to travel mostly during the school breaks or holiday sessions, therefore, their flexible traveling behavior will be accordingly influenced by this factor. Travelers during discussion also pointed out the high influence of travelers' occupation on his flexible traveling behavior, as travelers who are associated or are in a job that gives them high work load, lesser breaks and requires more on-job working and lesser mobility, would be less flexible in their traveling behavior. As for the factors that influence upon perception of a flexible online reservation system, our analysis showed that factors such as simplicity and easiness were again important determinants. From our in-depth interviews, it was found out that a flexible reservation system is considered to be the one that can provide alternative dates for flying to the traveler and at the same time offers self-adjustment functionality, such as cancellation and changes, in the itinerary of the traveler. Some travelers, who were non-native English speakers, pointed that a system would be flexible to them if it supports multi-languages.

Finally, focus group participants had better and deeper understanding of travelers' flexible behavior as well as that of reservation system. In-depth interview results as shown in Chapter 4, Section 4.4.1 with focus groups on factors influencing users' flexible traveling behavior were very much the same as the one discussed earlier. However, additional factors that came into the scene included discounted airfares versus normal airfares and time frame, peak versus off travel season, chosen to fly also substantially influences upon flexible traveling behavior. Focus group provided a more critical feedback on factors influencing upon perceived flexibility of an online airline reservation system and we were able to extract a number of important additional factors in our analysis.

The data collected from three different sources depicted a similarity pattern, especially in case of data collected from online travel forums and in-depth interviews. Data analysis provided a more detailed perspective of travelers' flexible behavior by incorporating socio-economic factors and societal influences. After giving much thought process to results as shown in Chapter 4, Section 4.4.1 following 6 themes emerged under factors influencing upon Flexible Traveling Behavior and 3 themes emerged under factors influencing upon perceived flexibility of a reservation system.

Theme 1: Travelers' Flexible Behavior is molded by their Traveling Consciousness – Consciousness is a subjective experience of awareness. In context of flexible traveling behavior, our study showed that travelers have a certain form consciousness or awareness about their traveling behavior. This resulted in the emergence of first theme.

"I look for great deals through promotional schemes" (ID P2)

"Why I wouldn't travel with an airline that provides heavy discounts? I look for discounts all the time" (ID P6)

"I make cognizant traveling decisions. Do all background work first and then make a decision to purchase a ticket or not" (OTF P11)

"Airlines hefty discounts through their travel mileage schemes are very attractive and can make me to travel any time during the year" (FG P7)

Theme 2: Travelers' Flexible Behavior is molded by their Belief that they have the Required Digital Skills – Study showed that having the digital skills to search for the best traveling deals, can influence upon once flexible traveling behavior. Digital skills reflect upon travelers' self-efficacy and have resulted in evolution of our theme 2.

"I don't care traveling with any airline, as I can find best traveling online deals with much ease" (OTF P8)

"I don't waste time on googling what I am looking for, I know where to exactly go when I need to purchase an online ticket" (ID P26)

"It takes patience and perseverance to find out best traveling deals" (OTF P3)

Theme 3: Travelers' Flexible Behavior is molded by their Self-belief as Flexible Travelers – This theme was categorized on the basis of how respondents reflected upon their self-identity as travelers. Two sub-themes emerged.

Sub theme 1: Traveling Motivation (traveling purpose, flying frequency, interest in recreation).

Motivation to travel is an important factor to influence upon travelers flexible behavior. For instance;

"It very much depends upon my traveling purpose and motivation" (ID P6)

"I love to travel, this is my biggest motivation" (OTF P1)

"As a sales man, if one has to travel around the year, his traveling motivation will be lower" (FG P15)

Sub theme 2: Socio-economic Position

Socio-economic standing of the traveler also influence upon flexible traveling behavior.

"depends on the job you are in" (OTF P4)

"... with limited financial resources, one can only long to take leisure trips" (ID P2)

"I am more flexible in traveling when I am paying for my ticket and can also compromise on comfort. This is not the case when my office is paying for me" (FG P9)

Theme 4: Travelers' Flexible Behavior is molded by Societal Influences –

This theme emerged due to the social influences that influence upon a traveler's flexible traveling behavior. Social influences occur when a traveler's flexible behavior is affected by other people.

"We travel with our two sons. So our preference is to travel during their school holidays" (ID P16)

"We look for cheap deals as we have a large family to support and travel together" (OTA P17)

"My father reserves ticket for me when I travel or I call my friend in a travel agency. They decide for me. Simple!" (ID P14)

Theme 5: Travelers' Flexible Behavior is molded by how they attribute A Cause to their Traveling Behavior – This theme emerged out a certain group of respondents who attributed a cause to their traveling behavior.

"We prefer Malaysian airlines over other airlines. It is our pride" (OTF P12)

"I prefer airlines with high repute, since they significantly enhance my traveling experience and pleasure" (ID P9)

"I am a supporter of eco-friendly living. I would be flexible to travel with an airline that supports this great cause" (ID P14)

"Airlines repute fascinates me a lot" (FG 8)

Theme 6: Travelers' Flexible Behavior is molded by their Prior Traveling Experiences – Surely, traveler's prior traveling experiences influence upon their

future traveling decisions. This theme has much to do with traveling comfort that one experiences.

"I prefer airlines with better leg space area and comfortable seats" (ID P30)

"Sometimes customers compromise on jet ways availability" (FG P18)

"Staff attitude is a traveling motivator" (OTF P11)

"We prefer airlines that serve Muslim halal food" (OTF P21)

Theme 7: Systems Perceived Flexibility is influenced by its Perceived Usability – A System will never be questioned for flexibility, if it satisfies users' expectations. Therefore, systems perceived flexibility is always dependent on the usability of a system.

"Searching for good packages using existing OTAs and SBTs is quite simple and easy" (ID P8)

"It requires the fewest steps to accomplish what users want to do" (FG 15)

"Users would prefer to use our system because they can make changes in their itinerary very easily" (FG 9)

Theme 8: Systems Perceived Flexibility is influenced by End User Support – Our study showed that post-sale features are very essential in determining the perceived flexibility of a system. This theme has much to do with the user support.

"Every online reservation system has the capability to reserve a ticket... .. for me a flexible system is the one which provides after sale service features" (ID 16)

"A flexible reservation system should support user prompting and guidelines throughout the reservation process" (FG P20)

Theme 9: Systems Perceived Flexibility is influenced by Comparison of Features on the Actual Level of Effect regarding to Complete the Reservation Process – This theme emerged due to the comparison features that influence upon

systems perceived flexibility. Provision of multiple features in search of a better flight fare on different dates enhances the systems perceived flexibility.

“Me as a user would like to compare flight fares on different dates” (ID P22)

“ It may (system) indicate about multiple destination options to users to choose from and accordingly point out fare changes” (FG P17)

“A system providing multiple searching options, like by dates, fares, destinations” (ID P14)

“If required, changes in itinerary can be made or at least recommended by the customer to the system” (ID P21)

Our analysis showed that an Online Airline Reservation System is perceived as flexible if it provides fare quotes, post-sale features and generates receipt. Likewise, if the reservation system can sort airfares on different dates and destinations, it will be perceived as flexible by users. Moreover, if the user is prompted throughout reservation process for his/her guidance, is timely notified on low airfares though flexible and alternative flying dates, it will influence upon user's perception of a flexible reservation system. Also by incorporating multiple traveling components in a single search, such as hotel search facility, the perceived flexibility of the reservation system will also be influenced.

The findings of the study showed that users traveling behavior is molded by a number of important personality relevant determinants, both internal and external in characteristics. While, traveling consciousness, self-efficacy in digital skills and self-belief as flexible travelers are internal personality relevant determinants influencing directly upon travelers flexible behavior, societal influences, attribution and prior experiences are external personality relevant determinants that indirectly influence upon travelers flexible behavior. Moreover, external determinant may not necessarily always have the same influence every time, depending upon the situation a traveler is in.

5.5 Classification of Users on the Basis of Their Flexible Traveling Behavior

The most important research question of this study was the categorization of users on the basis of their flexible traveling behavior. Results as shown in Chapter 4, Section 4.5.1 revealed that users can be classified as High, Medium and Low flexible on the basis of Users' Flexibility score. The study results was supported by other researchers [61] since consumer behavior researchers have frequently employed schema theory as the theoretical underpinning of their investigations for classification of consumers as with a likelihood of high purchase power, medium purchase power and low purchase power.

The results further revealed that Users' Flexible Behavior is positively associated with Perceived Usability of Flexible Online Airline Reservation Systems as shown in Chapter 4, Section 4.5.2. A traveler is categorized as highly flexible, if he/she possesses a flexible nature of traveling [188]. This indicates that he/she has a non-rigid schedule for traveling. Flexible travelers can travel on alternatively allocated itineraries and their traveling satisfaction comes mainly from heavy discounted fares provided by any airline. On the contrary, a traveler is categorized as low flexible, if he/she possesses an inflexible nature of traveling. This indicates that he/she has a rigid schedule for traveling. Low flexible travelers only prefer to travel as per their indicated or preferred itineraries and their traveling satisfaction comes mainly from meeting their flying deadlines that are mostly based on reaching their destination as per their preferred itineraries. This indicates that as Users' Flexible Behavior improves (from Low to Medium / from Medium to High), their Perceived Usability of Flexible Online Airline Reservation Systems tends to also improve.

To understand causality of interrelationships between Users' Flexible Behavior, System's Flexibility, System's Adaptability, System's Adaptivity and System's Personalization, conclusions are drawn about variability by squaring the correlation coefficients. By squaring the correlation coefficient, a measure of how much of the variability in one variable is explained by the other can be derived.

Although, System's Flexibility share a non-significant correlation coefficient with Users' Flexible Behavior, two of its sub-variables, System's Adaptability and

System's Personalization happen to be sharing significant correlations. The value of r^2 for System's Adaptability is $(0.372)^2 = 0.138$, and for System's Personalization is $(0.314)^2 = 0.098$. This explains how much of the variability in Users' Flexible Behavior is accounted for by two of the sub-measuring variables of System's Flexibility. In percentage terms, System's Adaptability accounts for approximately 14%, while System's Personalization accounts for approximately 10% of the variability in Users' Flexible Behavior and together the two variables account for approximately 24% variability.

5.6 Role of SQAs and External Variables in Flexible Behavior of Travelers

The Pearson Correlation Analysis as shown in Chapter 4, Section 4.6.1.2 demonstrated that all correlations are statistically significant. This may help explain the inconclusive results found by other researchers [89] to determine the contextual interpretation of any event by contextual factors that reinforce viewers' schemas, formulate characteristics of the surrounding environment and ensure effective collaboration between the two.

The results on scatter plot examining service quality attributes of the airline against users' flexible personality as shown in Chapter 4, Section 4.6.1.1 are normally distributed along with linear regression line and have no obvious outliers. 5 represented being least important in terms of compromising on service quality attributes of the airline, while 5 also represented being highly flexible in nature. Therefore, with every point increase in compromising on service quality attributes of the airline, users' flexible behavior tends to increase linearly. The R square for the best fit line is 62.7% indicating a very strong positive relationship between the two variables. This further means that about 62.7% of the variability in Users' Flexibility is accounted for by the service quality attributes they are ready to compromise on or to forgo. Similarly, the results on scatter plot examining external variables against users' flexible personality as shown in Chapter 4, Section 4.6.1.1 are normally distributed along with linear regression line and have no obvious outliers. 5 represented strongly agreeing to the influence of a particular external variable, while 5 also represented being highly flexible in nature. Therefore, with every point increase

in strongly agreeing to the external variable influences, users' flexible behavior tends to increase linearly. The R square for the best fit line is 63%, which indicates a very strong positive relationship between the two variables. This further means that about 63% of the variability in Users' Flexibility is accounted for by the external variables and their influences upon their traveling behavior.

The value of the R^2 as shown in Chapter 4, Section 4.6.1 is a measure of how much of the variability in the outcome is accounted for by the predictors. Its value is 0.669, which means that the two variables approximately account for 67% of the variation in predicting users' flexible behavior. The adjusted R^2 gives some idea of how well this model generalizes and the closer its value is to R^2 , the better it is considered for model fitness. In this case, difference for the model is reasonable ($0.669 - 0.667 = 0.002$ or 0.2%). This shrinkage means that if the model was derived from the population rather than sample, it would account for approximately 0.2% less negligible variance in the outcome.

In Multiple Regression, the model takes a form of an equation, which has a coefficient (b values) for each predictor variable. The first part of the table as shown in Chapter 4, Section 4.6.1.5 estimates ***b values*** which indicate individual contribution of each predictor to the model. The ***b value*** signifies relationship of each predicting independent variable in Users' Flexibility. A positive coefficient indicates a positive relationship, while a negative coefficient indicates a negative relationship. The ***b value*** also tells us to what degree each predicting independent variable affects Users' Flexibility, if the effects of all other predictors are held constant. The highest positive standardized beta value is for the external variables, namely "Persuasion" (0.264) closely followed by "Engagement" (0.166). This indicates these two independent external variables have a strong impact on determining users' flexible behavior, with variable former having a slightly higher impact. This is followed by a Service Quality Attribute of the airline, "Last minute discounted airfares" (.128), which also tends to have a hefty influence upon users' flexible traveling behavior. External variable "Identity" also makes it into the top contributing factors with standardized beta coefficient (0.125). Finally, Service Quality Attributes of the airline, "Immediate Confirmation of Itinerary on purchase" and "Confirmation of Origin and Destination

Airport” were found to have significant impact on determining Users’ Flexibility with beta coefficients of (.119) and (.113), respectively.

After examining direct relationship of each predicting variable with Users’ Flexibility, the **b value** of each predicting variable in association with its t-test statistic and significance level was interpreted. If the t-test associated with the **b value** is significant at either $p < 0.1$, 0.5 or 0.001 level, then that predictor is making a significant contribution to the model. For this model, external variables Persuasion ($t(249) = 1.335$; $p = .018 < .05$), Engagement ($t(249) = 2.548$; $p = .011 < .05$), Identity ($t(249) = 1.638$; $p = .037 < .05$) and Service Quality Attributes of the airline, last minute discounted airfares ($t(249) = 1.829$; $p = 0.43 < .05$), confirmation of origin and destination airport ($t(249) = 1.572$; $p = .017 < .05$) and immediate confirmation of itinerary on purchase ($t(249) = 1.542$; $p = .003 < .05$) are significant predictors of Users’ Flexibility.

5.7 User Perceived Usability with Existing and Proposed Systems

Researchers evaluate Perceived Usability of Online Airline Reservation Systems by doing content analysis on the basis of effectiveness, efficiency and satisfaction [101], [104]. It is also important to investigate web users’ characteristics, preferences, expectations [108] and their behavior from online systems, and to compare with the Perceived Usability of the systems. The findings of the study as shown in Chapter 4, Section 4.7.1 demonstrate significant differences on effectiveness, efficiency and satisfaction among the classified users on the basis of their flexible traveling behavior.

The study revealed significant results $F(2, 244) = 22.588$, $p < .001$ for the respondents who indicated that there is a significant main effect of the users’ classifications (High, Medium, and Low) on perceiving effectiveness of the proposed and existing systems. This effect indicates that overall, when the influence of existing and proposed system is ignored, the users’ classifications on the basis of their flexible traveling behavior (High, Medium, and Low) influenced upon how they perceive effectiveness of a system. When the effect of existing and proposed systems was examined on perceived effectiveness, there was a significant main effect, $F(1, 244) =$

26.627, $p < .001$. This effect means that with respect to ignoring the classification of users on the basis of their flexible traveling behavior, the proposed and existing systems influenced upon users' perceived effectiveness. Furthermore, F-test results further reveal a significant interaction between the effect of existing and proposed online reservation systems and the user classifications on perceived effectiveness, $F(2, 244) = 15.612$, $p < .001$ as shown in Chapter 4, Section 4.7.1.2.

The second F-test for respondents, who indicated that there is a significant effect of user's classifications on the basis of flexible traveling behavior, there was a significant main effect, $F(2, 244) = 6.065$, $p < .05$. This effect indicates that overall, when the influence of existing and proposed system is ignored, the users' classifications on the basis of their flexible traveling behavior (High, Medium, and Low) influenced upon how they perceive efficiency of a system. When the effect of existing and proposed systems is examined on perceived efficiency, there was not a significant main effect, $F(1, 244) = 0.545$, $p = .461$. This effect means that if we ignore the classification of users on the basis of their flexible traveling behavior, the proposed and existing systems does not influenced upon users' perceived efficiency. Furthermore, F-test results further reveal a significant interaction between the effect of existing and proposed online reservation systems and the user classifications on perceived efficiency, $F(2, 244) = 4.878$, $p < .05$ as shown in Chapter 4, Section 4.7.1.6.

This was followed by the third F-test examining the respondents, who indicated there is a significant effect of user's classifications on the basis of flexible traveling behavior, there was a significant main effect, $F(2, 244) = 3.476$, $p < .001$. This effect indicates that overall, when the influence of existing and proposed system is ignored, the users' classifications on the basis of their flexible traveling behavior (High, Medium, and Low) influenced upon how they perceive satisfaction of a system. When the effect of existing and proposed systems is examined on perceived satisfaction, there was a significant main effect, $F(1, 244) = 8.728$, $p < .05$. Furthermore, F-test results further reveal a significant interaction between the effect of existing and proposed online reservation systems and the user classifications on perceived satisfaction, $F(2, 244) = 7.372$, $p < .05$ as shown in Chapter 4, Section 4.7.1.10.

5.8 Multivariate Main Effect of User's Flexible Traveling Behavior on Proposed System's Effectiveness, Efficiency and Satisfaction

One of the major research questions of this study was to investigate the effects of user's flexible traveling behavior on the proposed system's effectiveness, efficiency and satisfaction. The findings of the results as shown in Chapter 4, Section 4.8.1 suggested that users with highly flexible behavior differed significantly from users with medium and low flexible behavior in terms of rating effectiveness, efficiency and satisfaction of the proposed system. This may help explain the inconclusive results found by other researchers [101] saying that Usability of a website cannot be improved without considering consumer intent and behavior.

Researchers [34]–[36] argued that clear understanding of consumer intent and behavior in the case of online airline ticket shopping and elsewhere cannot be achieved without considering the factors that affect purchase decisions. Results as shown in Chapter 4, Section 4.8.1.2 prove that the effectiveness of the proposed system differed significantly from users with highly flexible behavior with medium and least flexible behavior. Similarly, in the case of efficiency of the proposed system, users with highly flexible behavior differed significantly from users with least flexible behavior. Furthermore, satisfaction of the proposed system also differed significantly from users with highly flexible behavior with medium and least flexible behavior.

5.9 Recommendations for Flexible Online Airline Reservation Systems

Research findings show that system's perceived flexibility is reflected in its Perceived Usability. Perceived Usability is a combination of system's effectiveness, efficiency and satisfaction. End user support or user prompting is considered to be a supporting characteristic that substantially augments efficiency and effectiveness of the system, while multiple options directly influence upon user satisfaction. If a system provides ranges of dates as flying and source destination options at different fares, flexibility of the system is enhanced in its Perceived Usability in the eyes of the users. This is because if a user chooses a flying option 'A' from a given one or two options, he has not made a flexible decision. But if he chooses the same flying option 'A' from a

variety of given flying options, he is likely to enjoy extra satisfaction that he will get from the flexibility of the system and also in his purchase making decision. Likewise, if a system offers multiple flying options, they will also influence upon users' decision and make them change their mind to opt to fly from option 'B' instead of 'A'. This will again have positive influence upon user's satisfaction from the system – Perceived Usability.

This thesis suggests a new approach of reservations while introducing high, medium and low flexible travelers. Traditionally, flights schedule is made available for the travelers after finalizing the resources such as, planes, airports and dates. Travelers make reservations on their favorite dates using the offered flight schedule as shown in the Existing Approach of Figure 5.1. Current approach of airline reservation systems is adequate in terms of making reservations. However, traditional approach does not provide an opportunity to travelers of being flexible and also it does not provide any support to improve load factors in the flights, and therefore, airlines either cancel the flight [189] at 11th hour if they receive less booking in any particular day or they send flight with minimal profit margin.

In this study travelers are categorized on the basis of their flexible traveling behavior as shown in the Proposed Approach of Figure 5.1. In the proposed framework, least flexible customers may choose confirmed schedule offered by the airline with normal fare. Least flexible customers will get their confirmed tickets with seats allocated and itinerary finalized at the time of booking. Since flexible travelers are flexible enough and have not indicated their preferred dates to fly, therefore, they can be requested to provide their preferred time-frames (e.g. Departure: any flight between 10th June to 20th June from Kuala Lumpur to Frankfurt, Arrival: any flight between 10th July to 20th July from Frankfurt to Kuala Lumpur) in which they would like to travel. Tickets to highly flexible customers will be issued at booking time but the seats and flight day will be notified only a week before their actual departure day. Thus, it becomes the responsibility of the arbitrator systems to manage and finalize their traveling itineraries as per their indicated time-frames. Once done, the flexible customers can be allocated seats a few days before their actual departure by the airline.

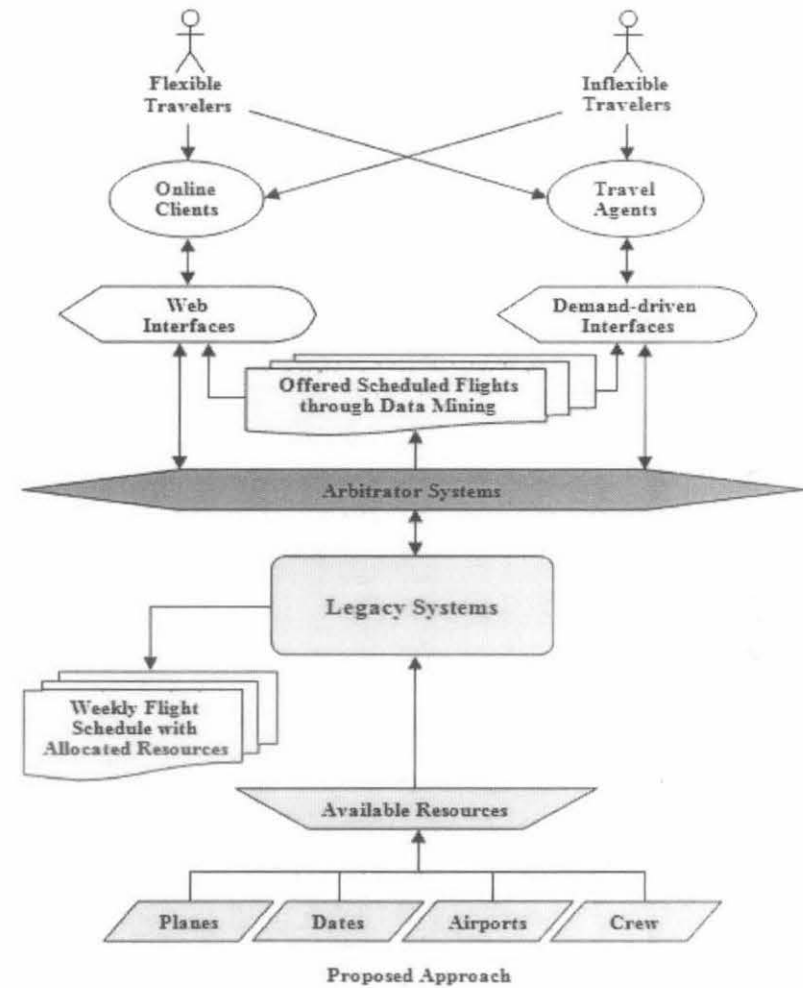
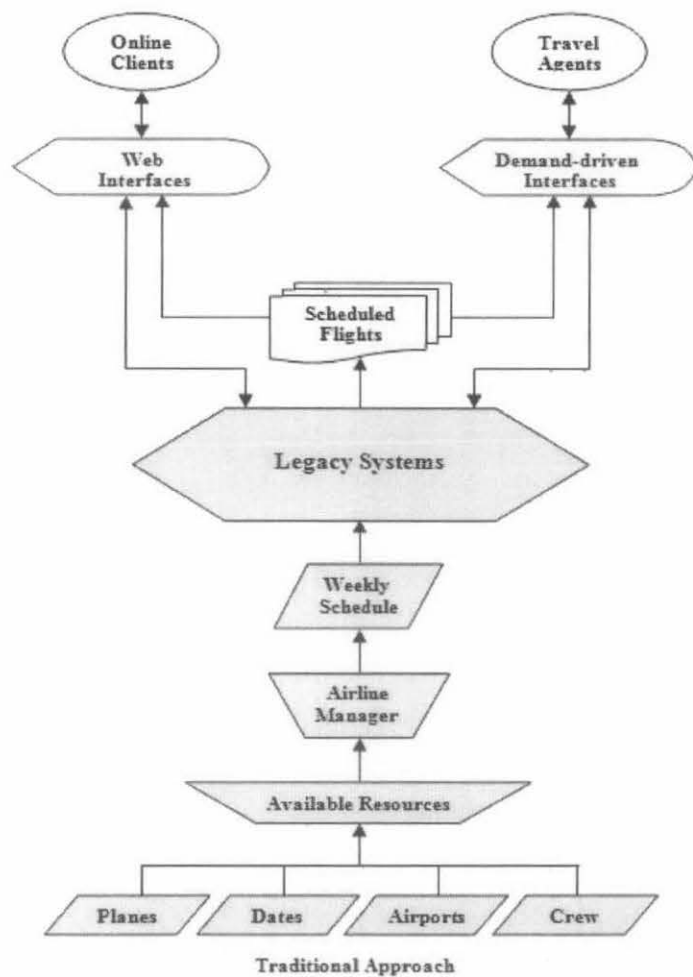


Figure 5.1: Framework for Flexible Online Airline Reservation Systems

5.9.1 Graphical User Interface for FOARS

The recommendations for the design of Flexible Online Airline Reservation helped in developing the Graphical User Interfaces as shown in the following sections.

5.9.1.1 Home Page of FOARS

Figure 5.2 shows interface for the Home Page of Flexible Online Airline Reservation System. The description of *Flexible* and *Inflexible* passengers as shown in Figure 5.2 will help users to understand the difference between the two terminologies used for booking purpose. Passengers who are flexible with regards to flying dates will be treated as *Flexible Passengers* and those who wish to travel on specified dates will be treated as *Inflexible Passengers*.

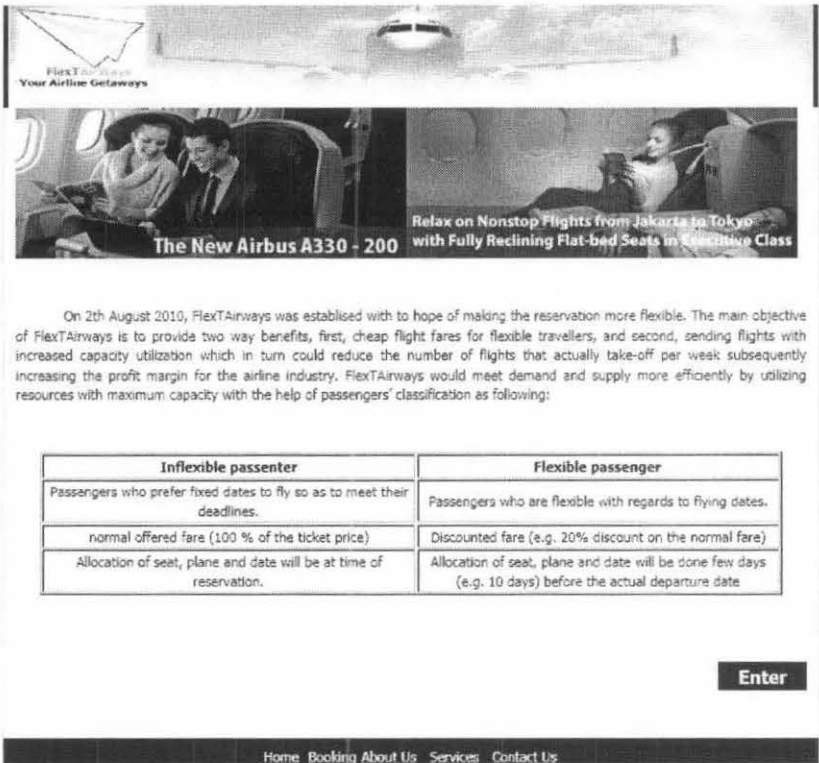


Figure 5.2: Home Page for Flexible Online Airline Reservation System

5.9.1.2 Booking Interface of FOARS

The users of FOARS will be provided two options for *Flight Type* i.e. Inflexible and Flexible as shown in Figure 5.3. If users opt for *Flexible Flight*, they will be requested to provide the number of days in which they will be flexible as shown in Figure 5.3



Figure 5.3: Booking Window for Flexible Online Airline Reservation System

5.9.1.3 Flight Search Window for Flexible Travelers

Flight search with *Flexible Flight Type* will let the users to the searched window with flights available within the flexible dates as shown in Figure 5.4.



Figure 5.4: Flight Search Window for Flexible Travelers

5.9.1.4 Travelers' Details Window for Flexible Travelers

Traveler will be requested to fill in the required information for the booking as shown in Figure 5.5.

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Meet the team who go the extra mile

ARTISTAL FLIGHTS

Help the environment by offsetting your carbon emissions

FLY GREEN

ARTISTAL FLIGHTS

ARTISTAL FLIGHTS

You are a flexible passenger

| Flight | | | | |
|--------------|-------|---------------|----------|---------|
| From | To | Flexible Days | Discount | Class |
| Kuala Lumpur | Dubai | 6 | 20% | Economy |

Lead Traveller

Full Name :

Mr

Date of Birth :

1

January

1957

Sex :

Male

Nationality :

Passport Number :

Contact Details

Address :

Home Telephone :

Mobile Telephone :

Email Address :




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Figure 5.5: Travelers' Details Window for Flexible Travelers

5.9.1.5 Payment Window for Flexible Travelers

Users will be requested to make payment with discounted air fare using the possible options as shown in Figure 5.6.

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ARTISTAL FLIGHTS

Booking > Flight Requirement > Travellers Details > Payment Method

You are a flexible passenger

| Flight | | | | |
|--------------|-------|---------------|----------|---------|
| From | To | Flexible Days | Discount | Class |
| Kuala Lumpur | Dubai | 6 | 20% | Economy |

Payment Details

Card Type :

Master Card

Card Number :

Card Holder :

Card Holder Telephone :

☐ Please tick this box to accept the

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Figure 5.6: Payment Method for Flexible Travelers

5.9.1.6 Immature Ticket Window for Flexible Travelers

Users will be issued a receipt of payment as shown in Figure 5.7. However, the allocation of flight out of the given flights will be done 10 days before the departure date.

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SALE

Booking > Flight Requirement > Travellers Details > Payment Method > Travellers Print Details

Travellers Details (Flexible)

| | |
|-------------------|--------------------------|
| Booking ID : | A1001 |
| Passport Number : | 12345678910 |
| Name : | Miss Gehan Yahya Alsalat |
| From : | Kuala Lumpur |
| To : | Dubai |
| Class Type : | Economy |
| Flexible Days : | 6 |
| Discount : | 20% |
| Total to pay : | MYR1725.60 |

Possible Dates for your Flight

| No. | From | To | Date | Time | Status |
|-----|--------------|-------|----------|-------|-----------|
| 1 | Kuala Lumpur | Dubai | 12/11/10 | 00:30 | Available |
| 2 | Kuala Lumpur | Dubai | 14/11/10 | 13:00 | Available |
| 3 | Kuala Lumpur | Dubai | 15/11/10 | 00:30 | Available |

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Figure 5.7: Immature Ticket for Flexible Travelers

5.9.1.7 Flight Search Window for Inflexible Travelers

Flight search with *Inflexible Flight Type* as discussed in Section 5.9.1.2 will let the users to the searched window with available flights as shown in Figure 5.8.



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Your Airline Getaways



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by offsetting



Booking > Flight Requirement

You are an inflexible passenger


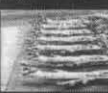
| | |
|-----------------------|--------------|
| From : | Kuala Lumpur |
| To : | Dubai |
| Request Date : | 09/11/10 |

Flight is not available on your requested dates.

The closest available dates have been shown instead

| Select | No. | Flight ID | From | To | Date | Time | Status |
|---|-----|-----------|--------------|-------|----------|-------|-----------|
|  | 1 | FA100 | Kuala Lumpur | Dubai | 12/11/10 | 00:30 | Available |
|  | 2 | FA105 | Kuala Lumpur | Dubai | 14/11/10 | 13:00 | Available |

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e travel

Beat Your Monday

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Figure 5.8: Flight Search Window for Inflexible Travelers

5.9.1.8 Travelers' Details Window for Inflexible Travelers

Traveler will be requested to fill in the required information for the booking as shown in Figure 5.9.

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Meet the team who go the extra mile

Help the environment by offsetting your carbon emissions

You are an inflexible passenger

| Flight | | | | | |
|-----------|--------------|-------|----------|-------|---------|
| Flight ID | From | To | Date | Time | Class |
| FA100 | Kuala Lumpur | Dubai | 12/11/10 | 00:30 | Economy |

Total to pay :MYR2157.00

Lead Traveller

Full Name:

My

Date of Birth

1 January 1957

Gender :

Male

Nationality :

Passport Number :

Contact Details

Address :

Home Telephone :

Mobile phone :

Email Address :

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Figure 5.9: Travelers' Details Window for Inflexible Travelers

5.9.1.9 Payment Window for Inflexible Travelers

Users will be requested to make payment with actual fare using the possible options as shown in Figure 5.10.

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Your Airline Getaways

Booking > Flight Requirement > Flight Price > Travellers Details > Payment Method

You are an inflexible passenger

| Flight | | | | | |
|-----------|--------------|-------|----------|-------|---------|
| Flight ID | From | To | Date | Time | Class |
| FA100 | Kuala Lumpur | Dubai | 12/11/10 | 00:30 | Economy |

Total to pay :MYR2157.00

Payment Details

Card Type :

Master Card

Card Number :

Card Holder :

Card Holder Telephone :

☐ Please tick this box to accept the

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Figure 5.10: Payment Method for Inflexible Travelers

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5.9.1.10 Ticket Window for Inflexible Travelers

Users will be issued a ticket with the allocation of flight, seat and other relevant information as shown in Figure 5.11.

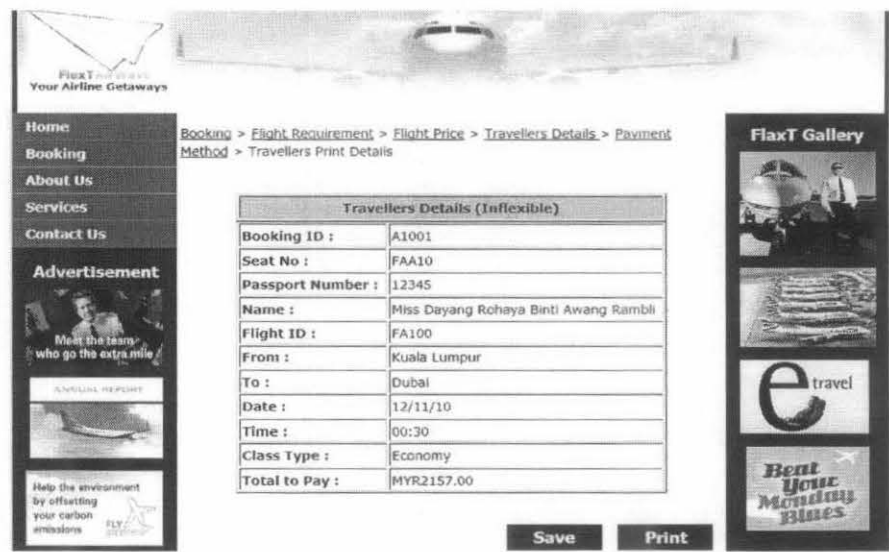


Figure 5.11: Confirmed Ticket for Inflexible Travelers

5.10 Chapter Summary

Results obtained during the study were discussed in this chapter. Results supported most of the hypothesis achieving all the three research objectives. In the first place System’s Flexibility and Users’ Flexibility were discussed to investigate the user needs associated with FOARS. This was followed by the discussion on the classification of users on the basis of their Flexible Traveling Behavior. Later, the results obtained from a case study to test the validity of the proposed framework for designing more FOARS was discussed. This study concludes that although System’s Flexibility and Users’ Flexibility are unequivocally independent of another, in terms of designing flexible Online Airline Reservation Systems, they are part of single quantum. While User’s Flexibility is related to their purchase making decisions, Systems Flexibility, although is reflected in its Perceived Usability, can influence upon user’s traveling behavior by enhancing their satisfaction. Finally, the recommendations for the designing of a more flexible Online Airline Reservation Systems were discussed.

CHAPTER 6

CONCLUSIONS

6.0 Chapter Overview

This chapter presents the summary of the thesis with major findings. Section 6.1 presents the dissertation summary while summarizing the overall thesis. Section 6.2 is dedicated for the major research findings and Section 6.3 is devoted for the future work.

6.1 Dissertation Summary

Behavioral characteristics in terms of making travelers flexible are appealing and an important area of research. This research provides a comprehensive study focused on what makes a traveler flexible on the basis of his/her behavioral characteristics, hence, giving a crucial insight for designing of flexible Online Airline Reservation Systems. This research therefore, contributes to the small but growing literature of designing flexible Online Airline Reservation Systems and provides a general framework by molding upon flexible behavior of travelers.

In this research a framework for flexible Online Airline Reservation Systems has been proposed, based on integrating opaque characteristics into the SBTs of airlines, to address the research gap as stated in Chapter 1. The framework is based on categorizing travelers on the basis of their flexible traveling behavior. Travelers with least flexible behaviour may choose confirmed schedule offered by the airline with normal fare. Least flexible customers will get their confirmed tickets with seats allocated and itinerary finalized at the time of booking. Since flexible travelers are flexible enough and have not indicated their preferred dates to fly, therefore, they can

be requested to provide their preferred time-frames in which they would like to travel instead of providing fixed schedule. Tickets to highly flexible customers will be issued at booking time but the seats and flight day will be notified only a week before their actual departure day. Thus, it becomes the responsibility of the arbitrator systems to manage and finalize their traveling itineraries as per their indicated time-frames. Once done, the flexible customers can be allocated seats a few days before their actual departure by the airline.

To develop the framework, existing Online Airline Reservation Systems were examined to assess the flexibility and usability of the systems. The overall research was divided into three phases and each phase contains one core research objective which was achieved through quantitative and qualitative techniques to assess System's Flexibility, Users' Flexibility and Usability of the systems. A redesign solution for enhanced usability was developed based on HCI guidelines and the flexibility tactics used in online travel agencies. A new flexible Online Airline Reservation System design was applied, which led to a proposed interface with the integration of opaque mechanism. The two interfaces were used in the case study. Participants were requested to complete the evaluation of the existing and proposed interfaces.

The benefit of framework given in this research can be used as a baseline for further studies and to design more flexible Online Airline Reservation Systems. Moreover, the Users' Flexibility measuring scale established and tested in this research is also a significant research contribution for future studies to measure flexibility. This research builds on previous and ongoing work within the disciplines of Human Computer Interaction by introducing psychometric scales to measure Users' Flexibility in terms of compromising on service quality attributes of an airline. Furthermore, this research introduces a new approach of reservations to increase the passenger load factor by leveraging upon travelers' flexibility. The Information System (IS) theory given through qualitative reporting is based on empirical findings, which is novel in its own right and testable in different environments.

6.2 Research Findings and Contributions

This study concludes that although System's Flexibility and Users' Flexibility are unequivocally independent of another, in terms of designing flexible Online Airline Reservation Systems, they are part of single quantum. While User's Flexibility is related to their purchase making decisions, Systems Flexibility, is reflected in its adaptability, adaptivity and personalisation. When considered together, the two can immensely enhance systems' perceived usefulness, as reflected in its effectiveness, efficiency and satisfaction.

The overall aim of this research was to investigate the associations between System's Flexibility, Users' Flexibility and Perceived Usability of Online Airline Reservation Systems and to propose a framework for flexible Online Airline Reservation Systems. This research has been conducted to answer the research questions and achieve the desired research objectives. The objectives were used as guidelines for the development and analysis of proposed framework. The findings of this research based on the objectives are summarized below:

6.2.1 Objective 1

To assess user needs (System's Flexibility and Users' Flexibility) associated with Online Airline Reservation Systems.

Findings – The literature was reviewed that revealed the facts that OTA's success immensely depends upon hidden or opaque characteristics. It was further revealed that an opaque characteristic depends on flexible behavior of travelers. Hence, it is important for the airlines to design their self-booking tools in view of customers' preferences, expectations and online usage behavior to run successful business. Therefore, the same concept of opaque mechanism was adopted for integration into SBTs of airlines and considered a potential research gap. The framework proposed in this study moulds upon flexible traveling behaviour of users' too and integrated opaque characteristics in designing of flexible Online Airline Reservation Systems.

Since flexibility is referred to its ability to respond to internal or external changes. Change can be defined as the transition over time which requires change agent. Researchers argued that “if the change agent is external to the system, then the change under consideration is a *flexible*-type change” [12]. Therefore, in case of SBTs incorporated with opaque fares would serve the role of external change agent by way of providing flexibility in users’ decision making. Similarly, “if the change agent is internal to the system, then the change under consideration is an *adaptable*-type change” [12]. Thus the provision of opaque fares into SBTs also serves the role of internal change agent by way of providing the capability of accepting changed decisions. If no change agent exists, then the system is rigid (no change can occur). Since provision of opaque fares could make users flexible and also increases the adaptability of the system, it is expected that the usability of the system would be enhanced.

The opaque fare mechanism depends on hidden characteristics of the traveling plan, thus leveraging upon traveling behavior of leisure travelers, who are always up for grabs and less sensitive to traveling plans. The findings showed that it is highly recommended by the experts in the airline industry for integration into SBTs.

6.2.2 Objective 2

To propose a framework for designing more flexible Online Airline Reservation Systems while classifying users on the basis of their Flexible Traveling Behavior.

Findings – The research revealed a framework for flexible Online Airline Reservation System based on the research scope as presented in Chapter 1. The framework is a general framework that can be applied to different reservation systems particularly, the Airline Reservation Systems due to their immense profit making potential and research gap as identified in Chapter 2 and framework methodology in Chapter 3. The framework is based upon investigating three research variables namely Users’ Flexibility, System’s Flexibility and Perceived Usability of Online Airline Reservation System. User’s Flexibility is based upon the extent to which they can forgo or compromise on service quality attribute of the airline. By doing this users’

classification based on their mental models was done for randomized experimentation of the existing and proposed interfaces. As for System's Flexibility the proposed and existing interfaces used in experimentation differed by way of leveraging upon opaque characteristics as offered by OTAs. The opaque characteristics in the proposed flexible systems will positively enhance perceived usefulness of the systems.

6.2.3 Objective 3

To study the interrelationship between System's Flexibility, Users' Flexibility and Perceived Usability of Online Airline Reservation Systems and to determine the Perceived Usability of the existing and proposed systems.

Findings – The research findings on the interrelationship between Users' Flexible Behavior and Perceived Usability showed positive relationship. This means that as one variable increases in value, the second variable also increases in value. This is called a positive correlation. The significance value indicates that the relationship between the two variables is genuine, hence both variable share positive relationship between each other. The overall relationship between User's Flexible Behavior and System's Flexibility showed non-significant values. However, there were significant relationships between User's Flexible Behavior and the two components of the System's Flexibility i.e. System's Adaptability and System's Personalization. Therefore, both variables i.e. System's Flexibility and Users' Flexibility are partially associated.

Furthermore, findings proved that System's Flexibility predicts Perceived Usability of the Online Airline Reservation Systems. What was more interesting is that when the effect of System's Flexibility was added, the effect of Users' Flexible Behavior remained significant towards predicting Perceived Usability of flexible Online Airline Reservation System.

Moreover, the findings of the study showed significant differences on effectiveness, efficiency and satisfaction with existing and proposed systems among the classified users on the basis of their Flexible Traveling Behavior. When the influence of existing and proposed system was examined on perceived effectiveness,

efficiency and satisfaction there was a significant main effect with effectiveness and satisfaction. This effect means that if we ignore the classification of users on the basis of their Flexible Traveling Behavior, the proposed and existing systems influenced upon users' perceived effectiveness and satisfaction. However, there was no significant effect of efficiency showing that if we ignore the classification of users on the basis of their flexible traveling behavior, the proposed and existing systems does not influenced upon users' perceived efficiency.

6.3 Future Work

The computerized translation of customers' flexible and inflexible traveling behavior into tailored and meaningful actionable results is currently not supported by any of the reservation systems in place. Moreover, a lot of the process involved in preparing tailor-made arrangements to cater for flexible and inflexible behavior of travelers can be automated – or at the very least significantly be optimized through technology. The current limitation of the research work is, a very basic Graphical User Interface design for the proposed framework has been developed and implemented. However, for giving flexible travel options early in the Online Airline Reservation Systems through formal opaque quoting mechanism, a very fluid interface based on arbitrator system between human input and database populated emails and documents is a potential research area and it can further be standardised in a way which would work for lots of traveling agencies and companies operating with different kinds of reservation systems.

To proceed further, one can create a layer on top of the standard system – everybody is booked onto a specific flight, but some days before the departure date the additional layer looks for better options and reshuffles the passengers in the legacy system below.

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LIST OF PUBLICATIONS

Journal Publications

1. A. Mushtaq, S. Sulaiman, P. D. D. Dominic, S. Riaz and M. A. T. Khalil, "A Study to Examine If Integration of OTAs Features can make SBTs more Flexible Online Airline Reservation Systems," *Information Technology Journal*, vol. 10, no. 7, pp. 1315–1324, 2011.
2. A. Mushtaq, S. Sulaiman and S. Riaz. "Flexibility Concept: Facilitating Post-Sale Changes in Online Reservation Systems," *International Journal on Computer Science and Engineering (IJCSE)*, vol. 1, no. 3, pp. 156–162, 2009.

Conference Publications

1. A. Mushtaq, S. Sulaiman, P. D. D. Dominic and S. Riaz, "A Qualitative Enquiry to Explore the Concept of Users' Perception on Factors Influencing Flexible Traveling Behavior and Flexible Online Airline Reservation Systems," in *Proceedings of the Digital Enterprise and Information Systems*, E. Ariwa and E. El-Qawasmeh (Eds.): DEIS 2011, CCIS 194, pp. 739–753, Springer-Verlag Berlin Heidelberg 2011.
2. A. Mushtaq, S. Sulaiman and J. Loviscach, "Issues with Flexibility: A Reason for not Using Online Reservation Systems?" in *Proceedings of the IEEE International Symposium on Information Technology*, vol. 3, pp. 1076–1081, 2010.
3. A. Mushtaq, S. Sulaiman, P. D. D. Dominic and S. Riaz, "Green Environment with Flexible Airline Reservation Systems," in *Proceedings of the IEEE International Conference on Intelligence and Information Technology*, Lahore, vol. 1, pp. 488–492, 2010.

APPENDIX A

SURVEY ON EVALUATION OF ONLINE AIRLINE RESERVATION SYSTEMS

SURVEY ON EVALUATION OF ONLINE AIRLINE RESERVATION SYSTEMS

Objective – The objective of this survey is to find out physiological, cognitive social behavior and the experience of the selected group of people who used airline online reservation systems.

The feedback of people may help to propose a better framework which could be used to design more flexible online reservation systems.

Last date of survey form submission – 15 October 2009

Note – Please return the form to the person/place from where it was collected before or by the deadline. In case of queries, please do not hesitate to contact the undersigned either by call or email.

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SECTION A – YOUR DETAILS

(Please place a tick (/) at the appropriate box)

1. Age

| | |
|---|-------|
| 1 | 16-25 |
| 2 | 26-35 |

| | |
|---|-------|
| 3 | 36-45 |
| 4 | 46-55 |

| | |
|---|----------|
| 5 | 56-65 |
| 6 | Above 65 |
2. Gender

| | |
|---|------|
| 1 | Male |
|---|------|

| | |
|---|--------|
| 2 | Female |
|---|--------|
3. Nationality

| | |
|---|-------------|
| 1 | Malaysian |
| 2 | EU National |

| | |
|---|------------------------|
| 3 | Pakistani |
| 4 | Others (specify _____) |
4. Educational background

| | |
|---|---------------|
| 1 | Post-graduate |
| 2 | Master |

| | |
|---|----------------|
| 3 | Under-graduate |
| 4 | Secondary |
5. How frequently you shop online?

| | |
|---|--------------|
| 1 | Mostly |
| 2 | Occasionally |

| | |
|---|--------|
| 3 | Rarely |
| 4 | Never |
6. Have you ever booked an online airline ticket?

| | |
|---|--|
| 1 | Yes (if "Yes" please attempt SECTION B only) |
| 2 | No (if "No" please attempt SECTION C only) |

SECTION B – USERS WITH ONLINE EXPERIENCES

(Please place a tick (/) at the appropriate box)

1. Which of the following airline's web-site you have used to book ticket?

| Name of the Airline | TRAVELLED | | |
|---------------------|-----------------|---------------|---------------------|
| | Last six months | Last one year | More than one years |
| 1. Malaysia Airline | | | |
| 2. Emirates Air | | | |

| | | | |
|--------------------------------------|--|--|--|
| 3. British Airways | | | |
| 4. Thai Airways | | | |
| 5. Lufthansa Auline | | | |
| 6. Pakistan International Airline | | | |
| 7. Air Asia | | | |
| 8. Other (please specify name) _____ | | | |

Flexibility of Existing Systems

2. Have you ever tried to make changes in your traveling dates online?
3. Have you ever tried to cancel your ticket online?
4. Have you ever tried to transfer your ticket to someone else online?
5. Have you ever tried to correct error (such as typos) in you name or in your address online?
6. Have you ever tried to reserve a ticket for few days with the intention to buy it later?

| Never | Unable to do so | Option not available | Successful |
|-------|-----------------|----------------------|------------|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

7. Rank the following features from 1 to 5 (1 most important – 5 least important) you would like to use in online system.

| | Rank | | Rank |
|--------------------------------------|------|----------------------------------|------|
| Online changes in traveling schedule | | Online correction of typo errors | |
| Online cancellation of ticket | | Online reservation of ticket | |
| Online transfer of ticket | | | |

Please indicate (tick) your level of agreement to the statement below

| Strongly Disagree (SDA) | Disagree (DA) | Neutral (N) | Agree (A) | Strongly Agree (SA) |
|-------------------------|---------------|-------------|-----------|---------------------|
| 1 | 2 | 3 | 4 | 5 |

Evaluation of Existing Online Systems

8. Reading characters on the screen of online reservation web site was hard.
9. Organization of information was confusing.
10. Sequence of screens was confusing.
11. Use of terms throughout system was inconsistent.
12. Position of messages on screen was inconsistent.
13. Learning to operate the system was difficult.
14. Provides effective linkage with other travel-related partners (e.g. link to other airline reservation system in case of connected flights).
15. The design for data entry was flexible.
16. The web site provides flexible user guidance.

| SDA | DA | N | A | SA |
|-----|----|---|---|----|
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |

17. Completion of processing was clearly indicated.
18. It requires the fewest steps possible to accomplish what I want to do with it.
19. I can use it without reading instructions.
20. Both occasional and regular users would like it.
21. I can recover from mistakes quickly and easily.
22. I would prefer to use online system for future booking.
23. I would recommend it to a friend.
24. Overall, I am satisfied with the support information (online-line help, messages, documentation) when completing the tasks.
25. Overall, I am satisfied with the ease of completing the tasks in this scenario.
26. Overall, I am satisfied with the amount of time it took to complete the tasks in this scenario.

| | | | | |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |

SECTION C – USERS WITHOUT ONLINE EXPERIENCES

Please indicate (tick) your level of agreement to the statement below

| Strongly Disagree (SDA) | Disagree (DA) | Neutral (N) | Agree (A) | Strongly Agree (SA) |
|-------------------------|---------------|-------------|-----------|---------------------|
| 1 | 2 | 3 | 4 | 5 |

Reason for not Using Online Reservation Systems

1. I do not have access to internet.
2. I do not know how to book an online ticket.
3. I am not comfortable shopping online.
4. I do not have credit/debit card to make an online booking.
5. I do not want to try because chances of frauds are there.
6. Online reservation systems are very complicated to use.
7. I do not use online systems because if some mistake will occur, how would I correct it?
8. I prefer to go to travel agent because they can find a better package for me.
9. I prefer to go to travel agent because they are more reliable.
10. I prefer to go to travel agent because I can request them to make changes in my flight schedule.
11. I prefer to go to travel agent because I can reserve tickets (for few days) without even paying a penny.
12. Rank the 3 most important reasons (from the above statements 1 to 11) for not using online systems 1.____
2.____ 3.____

| SDA | DA | N | A | SA |
|-----|----|---|---|----|
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 | 5 |

☺ Thank you very much for completing this questionnaire ☺

USERS' FLEXIBLE BEHAVIOR IN TERMS OF COMPROMISING ON SERVICE QUALITY ATTRIBUTES

Objective – The objective of this questionnaire is to find out the percentage of flexible users that will support the flexibility of reservation systems. The feedback received may help in designing more flexible reservation systems.

| | | | | | | | | | |
|---------------------------|---|---|--|---|---|---|---|---|---|
| 1. Age | <table border="1"><tr><td>1</td></tr><tr><td>4</td></tr></table> Below 20 years | 1 | 4 | <table border="1"><tr><td>2</td></tr><tr><td>5</td></tr></table> 21 to 30 years | 2 | 5 | <table border="1"><tr><td>3</td></tr><tr><td>6</td></tr></table> 31 to 40 years | 3 | 6 |
| 1 | | | | | | | | | |
| 4 | | | | | | | | | |
| 2 | | | | | | | | | |
| 5 | | | | | | | | | |
| 3 | | | | | | | | | |
| 6 | | | | | | | | | |
| | | | Above 60 years | | | | | | |
| 2. Gender | <table border="1"><tr><td>1</td></tr></table> Male | 1 | <table border="1"><tr><td>2</td></tr></table> Female | 2 | | | | | |
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |
| 3. Educational Background | <table border="1"><tr><td>1</td></tr><tr><td>4</td></tr></table> High School | 1 | 4 | <table border="1"><tr><td>2</td></tr></table> Diploma | 2 | <table border="1"><tr><td>3</td></tr></table> Graduate | 3 | | |
| 1 | | | | | | | | | |
| 4 | | | | | | | | | |
| 2 | | | | | | | | | |
| 3 | | | | | | | | | |
| | Post-graduate | | | | | | | | |
| 4. Occupation | <table border="1"><tr><td>1</td></tr><tr><td>4</td></tr></table> Student | 1 | 4 | <table border="1"><tr><td>2</td></tr></table> Professional | 2 | <table border="1"><tr><td>3</td></tr></table> Self Employed | 3 | | |
| 1 | | | | | | | | | |
| 4 | | | | | | | | | |
| 2 | | | | | | | | | |
| 3 | | | | | | | | | |
| | Retired | | | | | | | | |
| 5. Use of Online Tool | <table border="1"><tr><td>1</td></tr></table> SBT | 1 | <table border="1"><tr><td>2</td></tr></table> OTA | 2 | | | | | |
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|-------------------|----------|---------|-------|----------------|
|-------------------|----------|---------|-------|----------------|

6. I am not a frequent flyer, I fly only once in a year or so.
7. I normally fly to spend holidays with family/friends.
8. I am not a status conscious person. I can fly using any class.

9. I am excellent in computers skills; I can book my itinerary in a very short time
10. I am a regular news reader; I always keep myself updated on tourism.
11. I am excellent in managing trips; I can plan my trip in a very short time notice

12. Airline's reput does not fascinate me a lot; it plays a minor role in my reservations.
13. I do not always prefer my own country airline while reserving my tickets.
14. I do not always prefer to fly during occasions.
15. I do not always prefer to fly from my own town; I can take a flight from my neighbor town.
16. I do not always prefer airlines with better leg space area and comfortable seats.
17. I do not always prefer airlines which provide jet ways, so that I don't have to climb the gangway and wait for busses.

[illegible]

Engagement

18. The availability of rewards from customer loyalty programs motivates me to use the same airline for my next journey.
19. Staff attitude not always motivates me to use the same airline for my next journey.
20. I prefer airlines which contributes their efforts towards carbon free environment.

| - | - | 0 | + | ++ |
|---|---|---|---|----|
| | | | | |
| | | | | |
| | | | | |

Persuasion (criteria for choosing a flight)

21. I do not always fly during weekends.
22. I do not always use the same airline my ancestors uses used.
23. I easily get persuaded by cheap tickets; cheap tickets are at highest priority.
24. I do not always get persuaded by more baggage weight allowed.
25. I do not always prefer airlines with best food services; I do not eat much during journey.
26. I do not always fly during day time.
27. I do not always prefer airlines with excellent complaint handling services.

| - | - | 0 | + | ++ |
|---|---|---|---|----|
| | | | | |
| | | | | |
| | | | | |

Qualitative Perception of Flexibility

28. For me a system is flexible if I can do changes in my itinerary.
29. For me a system is flexible if I can complete my work.
30. For me a system is flexible if I can recover from mistakes quickly and easily.
31. For me a system is flexible if it offers all features I intend to use.

| - | - | 0 | + | ++ |
|---|---|---|---|----|
| | | | | |
| | | | | |
| | | | | |

Satisfaction

32. Overall, I am not satisfied with how easy it is to use this website.
33. It was not simple to use this website.
34. I cannot effectively complete my work using this website.
35. I am not able to complete my work quickly using this website.
36. I am not able to efficiently complete my work using this website.
37. I do not feel comfortable using this website.
38. It was not easy to learn to use this website.
39. I believe I became unproductive quickly using this website.
40. The website does not give error messages that clearly tell me how to fix problems.
41. Whenever, I make a mistake using the website, I cannot recover easily and quickly.
42. The information (such as online help, on-page messages, and other documentation) provided with this website is not clear.
43. It is not easy to find the information I need.
44. The information provided by the website is not easy to understand.

| - | - | 0 | + | ++ |
|---|---|---|---|----|
|---|---|---|---|----|

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APPENDIX C

USERS' FLEXIBILITY TOWARDS FLEXIBLE ONLINE AIRLINE RESERVATION SYSTEMS

Users' Flexibility towards Flexible Online Airline Reservation Systems (FOARS)

Objective – The objective of this questionnaire is to find out the degree of flexibility of airline travelers. The feedback received may help in designing more flexible reservation systems.

General Information (Please place a tick (✓) at the appropriate box)

1. Age

| | | | | | |
|---|----------------|---|----------------|---|----------------|
| 1 | Below 20 years | 2 | 21 to 30 years | 3 | 31 to 40 years |
| 4 | 41 to 50 years | 5 | 51 to 60 years | 6 | Above 60 years |
2. Gender

| | | | |
|---|------|---|--------|
| 1 | Male | 2 | Female |
|---|------|---|--------|
3. Educational Background

| | | | | | |
|---|---------------|---|---------|---|----------|
| 1 | High School | 2 | Diploma | 3 | Graduate |
| 4 | Post-graduate | | | | |
4. Occupation

| | | | | | |
|---|---------|---|--------------|---|---------------|
| 1 | Student | 2 | Professional | 3 | Self Employed |
| 4 | Retired | | | | |
5. Ethnicity

| | | | | | |
|---|---------|---|----------|---|---------|
| 1 | EU | 2 | Asian | 3 | African |
| 4 | Western | 5 | Far East | 6 | Others |

| Rate your priorities for the following service quality attributes of an airline in terms of their importance. | Highest | High | Neutral | Low | Least |
|---|---------|------|---------|-----|-------|
| 6. Flying date confirmation | 1 | 2 | 3 | 4 | 5 |
| 7. Flying carrier confirmation | | | | | |
| 8. Flying time confirmation | | | | | |
| 9. Number of stop-over | | | | | |
| 10. Number of connected flights | | | | | |
| 11. Ticket class (economy business) | | | | | |
| 12. Seat specifications | | | | | |
| 13. Discounted airfares | | | | | |
| 14. Origin Destination airports | | | | | |
| 15. Immediate confirmation of itinerary on purchase of ticket | | | | | |

Please indicate which of the following statements describes you in the best possible way?

| Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|-------------------|----------|---------|-------|----------------|
| 1 | 2 | 3 | 4 | 5 |

16. I rarely prefer my own country's airline.
17. I rarely prefer airlines that provide jet ways, so that I don't have to climb the gangway and wait for busses.
18. I rarely prefer to fly during occasions.
19. Peak time travel does not fascinate always.
20. Off time travel does not fascinate always.
21. I would prefer to use systems that contribute their efforts towards carbon free environment.

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

APPENDIX D

TRANSFORMATION OF EVALUATORS USERS' FLEXIBILITY SCORING

Transformation of Evaluators Users' Flexibility Scoring

| Evaluators | Date Confirmation | Carner Confirmation | Time Confirmation | No. of Stop-over | No. of Connected Flights | Ticket Class | Seat Specification | Discounted Airfares | Immediate Confirmation of Itinerary | Destination Source Airport | Users' Flexibility Score |
|------------|-------------------|---------------------|-------------------|------------------|--------------------------|--------------|--------------------|---------------------|-------------------------------------|----------------------------|--------------------------|
| User 1 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 7 |
| User 2 | 4 | 4 | 4 | 1 | 4 | 3 | 4 | 5 | 4 | 5 | 8 |
| User 3 | 4 | 4 | 4 | 3 | 3 | 4 | 3 | 5 | 3 | 4 | 7 |
| User 4 | 5 | 4 | 5 | 4 | 4 | 4 | 5 | 3 | 3 | 4 | 11 |
| User 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 3 | 5 | 1 | 5 |
| User 6 | 5 | 4 | 5 | 4 | 4 | 3 | 5 | 3 | 4 | 1 | 8 |
| User 7 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 2 | 3 | 4 | 10 |
| User 8 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 3 | 4 | 11 |
| User 9 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 19 |
| User 10 | 5 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 1 | 11 |
| User 11 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 5 | 3 | 3 | 6 |
| User 12 | 5 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 3 | 2 | 11 |
| User 13 | 5 | 5 | 4 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 14 |
| User 14 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 3 | 16 |
| User 15 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 3 | 2 | 12 |
| User 16 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 2 | 17 |
| User 17 | 5 | 4 | 5 | 4 | 4 | 4 | 3 | 4 | 3 | 3 | 9 |
| User 18 | 5 | 4 | 5 | 4 | 4 | 4 | 3 | 3 | 2 | 3 | 8 |
| User 19 | 5 | 4 | 5 | 4 | 4 | 4 | 3 | 3 | 3 | 4 | 9 |
| User 20 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 18 |
| User 21 | 5 | 4 | 5 | 4 | 5 | 4 | 4 | 2 | 4 | 3 | 10 |
| User 22 | 4 | 5 | 4 | 5 | 4 | 3 | 4 | 3 | 3 | 2 | 7 |
| User 23 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 5 | 5 | 18 |
| User 24 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 12 |
| User 25 | 5 | 4 | 5 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 6 |
| User 26 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 19 |
| User 27 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 2 |
| User 28 | 5 | 4 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| User 29 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 18 |
| User 30 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 17 |
| User 31 | 5 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 15 |
| User 32 | 5 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 15 |
| User 33 | 5 | 4 | 4 | 4 | 3 | 4 | 5 | 3 | 3 | 3 | 7 |
| User 34 | 5 | 4 | 5 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 9 |
| User 35 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 14 |
| User 36 | 5 | 5 | 4 | 5 | 5 | 4 | 4 | 4 | 4 | 2 | 12 |
| User 37 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 3 | 3 | 1 | 8 |
| User 38 | 5 | 4 | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 5 |
| User 39 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 9 |
| User 40 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 2 | 8 |
| User 41 | 5 | 4 | 3 | 4 | 4 | 3 | 4 | 3 | 3 | 3 | 6 |
| User 42 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 11 |
| User 43 | 5 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 3 | 13 |
| User 44 | 5 | 5 | 4 | 5 | 5 | 4 | 4 | 4 | 3 | 1 | 10 |
| User 45 | 5 | 4 | 5 | 5 | 4 | 4 | 4 | 4 | 2 | 2 | 9 |
| User 46 | 5 | 5 | 4 | 5 | 5 | 4 | 4 | 4 | 4 | 2 | 12 |
| User 47 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 10 |
| User 48 | 5 | 5 | 4 | 5 | 5 | 4 | 4 | 3 | 2 | 1 | 8 |
| User 49 | 5 | 4 | 5 | 5 | 4 | 4 | 3 | 3 | 3 | 2 | 9 |
| User 50 | 5 | 5 | 4 | 5 | 4 | 4 | 4 | 4 | 3 | 2 | 10 |
| User 51 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 4 | 2 | 2 | 9 |
| User 52 | 4 | 5 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 7 |
| User 53 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 2 | 9 |
| User 54 | 5 | 5 | 5 | 5 | 5 | 4 | 3 | 3 | 3 | 2 | 8 |
| User 55 | 5 | 4 | 4 | 5 | 4 | 4 | 4 | 3 | 3 | 3 | 9 |
| User 56 | 5 | 4 | 4 | 5 | 4 | 4 | 4 | 3 | 3 | 3 | 9 |
| User 57 | 5 | 4 | 5 | 4 | 5 | 4 | 3 | 3 | 3 | 2 | 8 |
| User 58 | 5 | 4 | 5 | 4 | 4 | 5 | 3 | 4 | 3 | 1 | 8 |
| User 59 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 3 | 3 | 8 |
| User 60 | 5 | 3 | 5 | 4 | 4 | 4 | 4 | 4 | 2 | 2 | 9 |
| User 61 | 5 | 4 | 5 | 4 | 4 | 3 | 4 | 3 | 4 | 1 | 7 |
| User 62 | 5 | 4 | 5 | 4 | 3 | 4 | 4 | 2 | 3 | 2 | 7 |

APPENDIX E

CLASSIFICATION OF TRAVELERS' ON THE BASIS OF THEIR FLEXIBLE TRAVELING BEHAVIOR

Classification of Travelers' on the basis of their Flexible Traveling Behavior

| Evaluators | Date Confirmation | Camer Confirmation | Time Confirmation | No. of Stop-over | No. of Connected Flights | Ticket Class | Seat Specification | Discounted Airfares | Immediate Confirmation of Itinerary | Destination Source Airport | Users' Flexibility Score | Classify |
|------------|-------------------|--------------------|-------------------|------------------|--------------------------|--------------|--------------------|---------------------|-------------------------------------|----------------------------|--------------------------|----------|
| User 1 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 7 | 1 |
| User 2 | 4 | 4 | 4 | 1 | 4 | 3 | 4 | 5 | 4 | 5 | 8 | 2 |
| User 3 | 4 | 4 | 4 | 3 | 3 | 4 | 3 | 5 | 3 | 4 | 7 | 1 |
| User 4 | 5 | 4 | 5 | 4 | 4 | 4 | 5 | 3 | 3 | 4 | 11 | 2 |
| User 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 3 | 3 | 1 | 8 | 2 |
| User 6 | 5 | 4 | 5 | 4 | 4 | 3 | 5 | 3 | 4 | 1 | 8 | 2 |
| User 7 | 4 | 3 | 4 | 5 | 4 | 5 | 4 | 2 | 3 | 4 | 10 | 2 |
| User 8 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 3 | 4 | 11 | 2 |
| User 9 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 19 | 3 |
| User 10 | 5 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 1 | 11 | 2 |
| User 11 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 6 | 1 | |
| User 12 | 5 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 3 | 2 | 11 | 2 |
| User 13 | 5 | 5 | 4 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 14 | 3 |
| User 14 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 3 | 16 | 3 |
| User 15 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 3 | 2 | 12 | 2 |
| User 16 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 2 | 17 | 3 |
| User 17 | 5 | 4 | 5 | 4 | 4 | 4 | 3 | 4 | 3 | 3 | 9 | 2 |
| User 18 | 5 | 4 | 5 | 4 | 4 | 4 | 3 | 3 | 2 | 3 | 8 | 2 |
| User 19 | 5 | 4 | 5 | 4 | 4 | 4 | 3 | 3 | 3 | 4 | 9 | 2 |
| User 20 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 3 | 4 | 18 | 3 |
| User 21 | 5 | 4 | 5 | 4 | 5 | 4 | 4 | 2 | 4 | 3 | 10 | 2 |
| User 22 | 4 | 5 | 4 | 5 | 4 | 3 | 4 | 3 | 3 | 2 | 7 | 1 |
| User 23 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 5 | 5 | 18 | 3 |
| User 24 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 12 | 2 |
| User 25 | 5 | 4 | 5 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 6 | 1 |
| User 26 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 19 | 3 |
| User 27 | 5 | 5 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 1 |
| User 28 | 5 | 4 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 1 |
| User 29 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 18 | 3 |
| User 30 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 17 | 3 |
| User 31 | 5 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 15 | 3 |
| User 32 | 5 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 15 | 3 |
| User 33 | 5 | 4 | 4 | 4 | 3 | 4 | 5 | 3 | 3 | 3 | 7 | 1 |
| User 34 | 5 | 4 | 5 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 9 | 2 |
| User 35 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 14 | 3 |
| User 36 | 5 | 5 | 4 | 5 | 5 | 4 | 4 | 4 | 4 | 2 | 12 | 2 |
| User 37 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 3 | 3 | 1 | 5 | 2 |
| User 38 | 5 | 4 | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 5 | 1 |
| User 39 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 9 | 2 |
| User 40 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 2 | 8 | 2 |
| User 41 | 5 | 4 | 3 | 4 | 4 | 3 | 4 | 3 | 3 | 3 | 6 | 1 |
| User 42 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 11 | 2 |
| User 43 | 5 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 3 | 13 | 2 |
| User 44 | 5 | 5 | 4 | 5 | 5 | 4 | 4 | 4 | 3 | 1 | 10 | 2 |
| User 45 | 5 | 4 | 5 | 5 | 4 | 4 | 4 | 4 | 5 | 2 | 9 | 2 |
| User 46 | 5 | 5 | 4 | 5 | 5 | 4 | 4 | 4 | 4 | 2 | 12 | 2 |
| User 47 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 10 | 2 |
| User 48 | 5 | 5 | 4 | 5 | 5 | 4 | 4 | 3 | 3 | 1 | 8 | 2 |
| User 49 | 5 | 5 | 5 | 5 | 4 | 4 | 3 | 3 | 3 | 2 | 9 | 2 |
| User 50 | 5 | 5 | 4 | 5 | 4 | 4 | 4 | 4 | 3 | 2 | 10 | 2 |
| User 51 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 4 | 2 | 2 | 9 | 2 |
| User 52 | 4 | 5 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 7 | 1 |
| User 53 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 2 | 9 | 2 |
| User 54 | 5 | 5 | 5 | 5 | 5 | 4 | 3 | 5 | 5 | 2 | 8 | 2 |
| User 55 | 5 | 4 | 4 | 5 | 4 | 4 | 4 | 3 | 3 | 3 | 9 | 2 |
| User 56 | 5 | 4 | 4 | 5 | 4 | 4 | 4 | 3 | 3 | 3 | 9 | 2 |
| User 57 | 5 | 4 | 5 | 4 | 5 | 4 | 3 | 3 | 3 | 2 | 8 | 2 |
| User 58 | 5 | 4 | 5 | 4 | 4 | 5 | 3 | 4 | 3 | 1 | 8 | 2 |
| User 59 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 3 | 3 | 3 | 8 | 2 |
| User 60 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 2 | 2 | 9 | 2 |
| User 61 | 5 | 4 | 5 | 4 | 4 | 3 | 4 | 3 | 4 | 1 | 7 | 1 |
| User 62 | 5 | 4 | 5 | 4 | 3 | 4 | 4 | 3 | 3 | 2 | 7 | 1 |

Classification:
1 – Low Flexible
2 – Medium Flexible
3 – High Flexible

APPENDIX F

PERMISSION TO COLLECT DATA FROM TRAVEL AGENTS FOR RESEARCH

PURPOSES



UNIVERSITI TEKNOLOGI
PETRONAS
PETRONAS UNIVERSITY

5th March 2011

To Whom It May Concern

Ref: Permission to Collect Data from Travel Agents for Research Purposes

The above matter is referred:


Mr. Amir M. Shazli is one of my PhD students at Universiti Teknologi PETRONAS whose research involves in low flight reservation systems. He is currently in the data gathering stage where he needs to interview and conduct a survey to travel agents and potential customers in order to proceed with his work.

With this regard, I am seeking for your kind approval and cooperation to allow Mr. Amir to conduct his study on your company. I am giving assurance that all data collected will be kept confidential and strictly for research purposes only. Also, the study to be conducted will not disrupt the smooth running of the event.

I would like to thank you for your kind cooperation and support in this matter. Please do not hesitate to contact me if you need any further information or clarification regarding this request.

Thank you,

Yours sincerely,


Dr. Saiful Hilleman
Senior Lecturer/Researcher
Department of Computer and Information Systems
Universiti Teknologi PETRONAS
37756 Trusmi
Perak

Tel: 05-3697411

Fax: 05-3698180

Email: saiful@petronas.com.my

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Universiti Teknologi PETRONAS

APPENDIX G

PERMISSION TO COLLECT DATA FROM TRAVEL AGENTS AT MATTA

FAIR 2011



PETRONAS
Petroliam Nasional Berhad

Ms Hong
Operations Manager
MATTA Fair 2011
Kuala Lumpur

30 January 2011

Sdr. Ms Hong

Ref.: Permission to Collect Data from Travel Agents at MATTA Fair 2011 for Research Purposes

The above matter is referred:

Mr. Aul Mushtaq is one of my PhD students at Universiti Teknologi PETRONAS whose research involves online flight reservation systems. He is currently in the data gathering stage where he needs to interview and conduct a survey to travel agents and potential customers in order to proceed with his work.

With this regard, I am seeking for your kind approval and permission to allow Mr. Aul to conduct his study during the forthcoming MATTA Fair 2011 in Kuala Lumpur. I am giving assurance that all data collected will be kept confidential and strictly for research purpose only. Also, the study to be conducted will not affect the smooth running of the event.

I would like to thank you for your kind cooperation and support in this matter. Please do not hesitate to contact me if you need any further information or clarification regarding this request.

Thank you.

Yusuf S. Ghahary
PhD Student
Dr. Saizal B. Osman
Senior Lecturer/Researcher
Department of Computer and Information Sciences
Universiti Teknologi PETRONAS
31300 Tronoh
Perak

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SAIZAL B. OSMAN (PhD Student)

Department of Computer and Information Sciences

UTPETRONAS

Universiti Teknologi PETRONAS, 31300 Tronoh, Perak

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APPENDIX H

PERMISSION TO COLLECT DATA FROM TRAVEL AGENTS AT MATTA

FAIR 2011

Usability Evaluation Checklist

| Guidelines | | Rating | Comments |
|--|---|--------|----------|
| Chapter 2: Optimizing the User Experience | | | |
| 2.1 | Do Not Display Unsolicited Windows or Graphics | | |
| 2.2 | Increase Web Site Credibility | | |
| 2.3 | Standardize Task Sequences | | |
| 2.4 | Reduce the User's Workload | | |
| 2.5 | Display Information in a Directly Usable Format | | |
| 2.6 | Do Not Require Users to Multitask While Reading | | |
| 2.7 | Use Users' Terminology in Help Documentation | | |
| 2.8 | Provide Assistance to Users | | |
| Chapter 5: The Homepage | | | |
| 5.1 | Create a Positive First Impression of Your Site | | |
| 5.2 | Communicate the Web Site's Value and Purpose | | |
| 5.3 | Limit Prose Text on the Homepage | | |
| 5.4 | Limit Homepage Length | | |
| Chapter 6: Page Layout | | | |
| 6.1 | Avoid Cluttered Displays | | |
| 6.2 | Place Important Items Consistently | | |
| 6.3 | Place Important Items at Top Center | | |
| 6.4 | Structure for Easy Comparison | | |
| 6.5 | Use Moderate White Space | | |
| 6.6 | Choose Appropriate Line Lengths | | |
| Chapter 8: Scrolling and Paging | | | |
| 8.1 | Eliminate Horizontal Scrolling | | |
| 8.2 | Facilitate Rapid Scrolling While Reading | | |
| Chapter 9: Headings, Titles, and Labels | | | |
| 9.1 | Use Clear Category Labels | | |
| 9.2 | Use Unique and Descriptive Headings | | |
| 9.3 | Highlight Critical Data | | |
| 9.4 | Provide Users with Good Ways to Reduce Options | | |
| Chapter 11: Text Appearance | | | |
| 11.1 | Use Black Text on Plain, High Contrast Backgrounds | | |
| 11.2 | Format Common Items Consistently | | |
| 11.3 | Ensure Visual Consistency | | |
| 11.4 | Use Bold Text Sparingly | | |
| 11.5 | Use Attention-Attracting Features when Appropriate | | |
| 11.6 | Use Familiar Fonts | | |
| 11.7 | Use at Least 12-Point Font | | |
| 11.8 | Color-Coding and Instructions | | |
| 11.9 | Emphasize Importance | | |
| Chapter 15: Writing Web Content | | | |
| 15.1 | Make Action Sequences Clear | | |
| 15.2 | Use Familiar Words | | |
| 15.3 | Define Acronyms and Abbreviations | | |
| 15.4 | Use Mixed Case with Prose | | |
| 15.5 | Limit the Number of Words and Sentences | | |
| 15.6 | Use Active Voice | | |
| Chapter 16: Content Organization | | | |
| 16.1 | Organize Information Clearly | | |
| 16.2 | Ensure that Necessary Information is Displayed | | |
| 16.3 | Group Related Elements | | |
| 16.4 | Minimize the Number of Clicks or Pages | | |
| 16.5 | Design Quantitative Content for Quick Understanding | | |
| 16.6 | Display Only Necessary Information | | |
| 16.7 | Format Information for Multiple Audiences | | |
| 16.8 | Use Color for Grouping | | |

Note: Assign each guideline a problem severity rating as follows

- N/A = Not Applicable
- 0 = I don't agree that this is a usability problem at all
- 1 = Cosmetic problem only: need not be fixed unless extra time is available on project
- 2 = Minor usability problem: fixing this should be given low priority
- 3 = Major usability problem: important to fix, so should be given high priority
- 4 = Usability catastrophe: imperative to fix this before product can be released